

FIGURE 1

1139.1133101(4000Y489)

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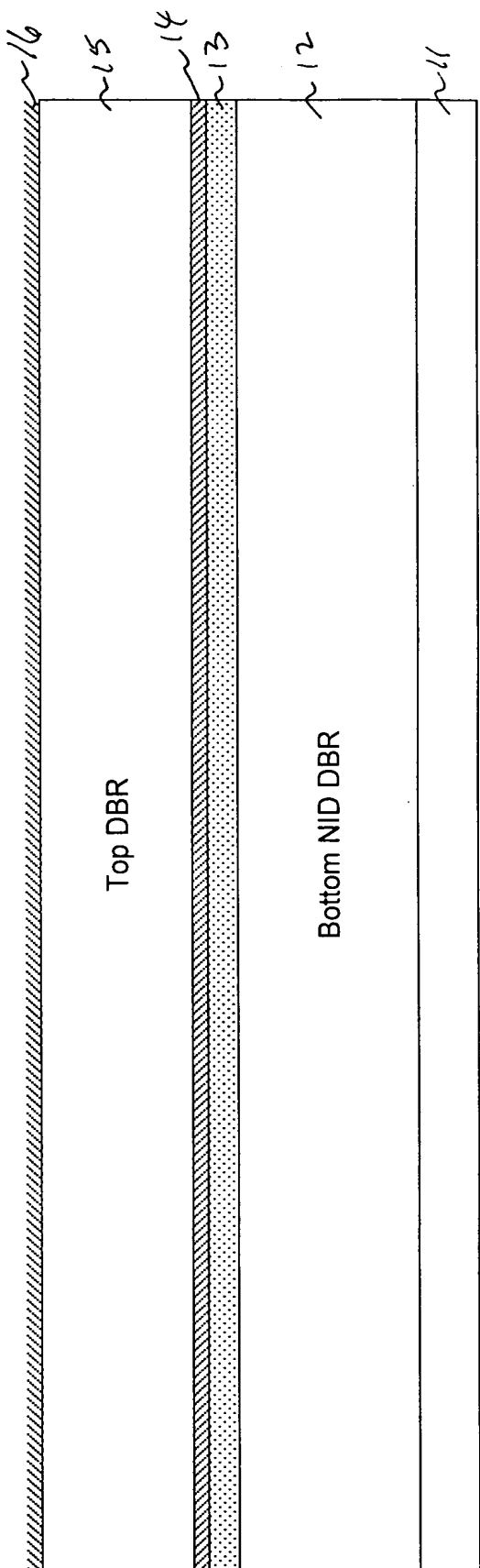


FIGURE 2

1139.113310/
H0004489

10

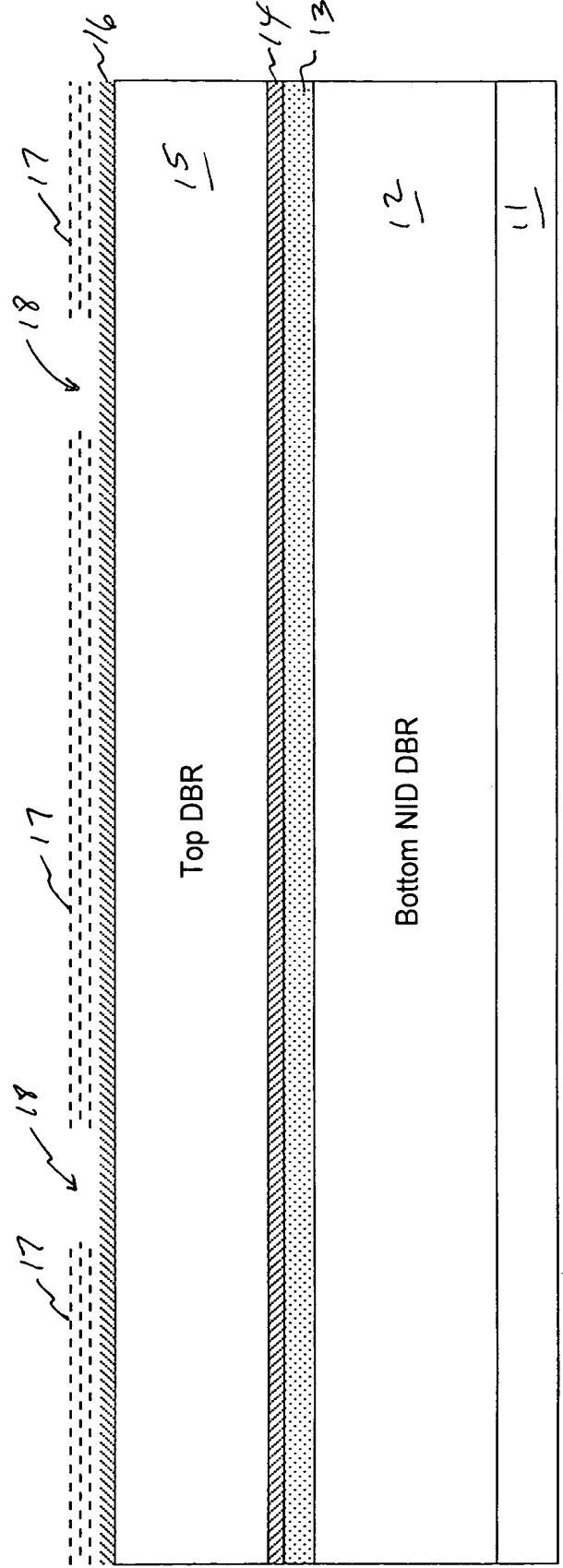


FIGURE 2a

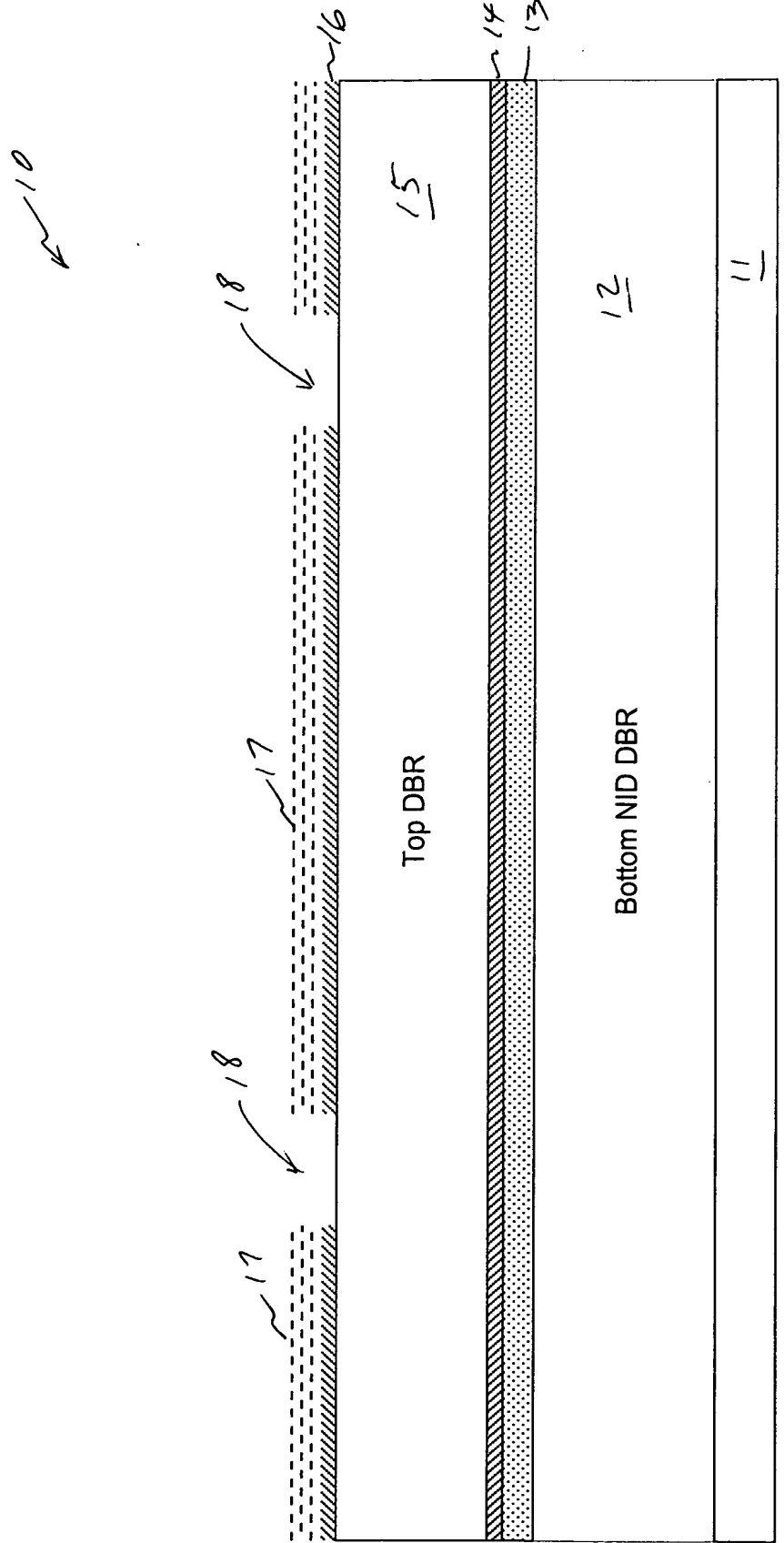


FIGURE 3

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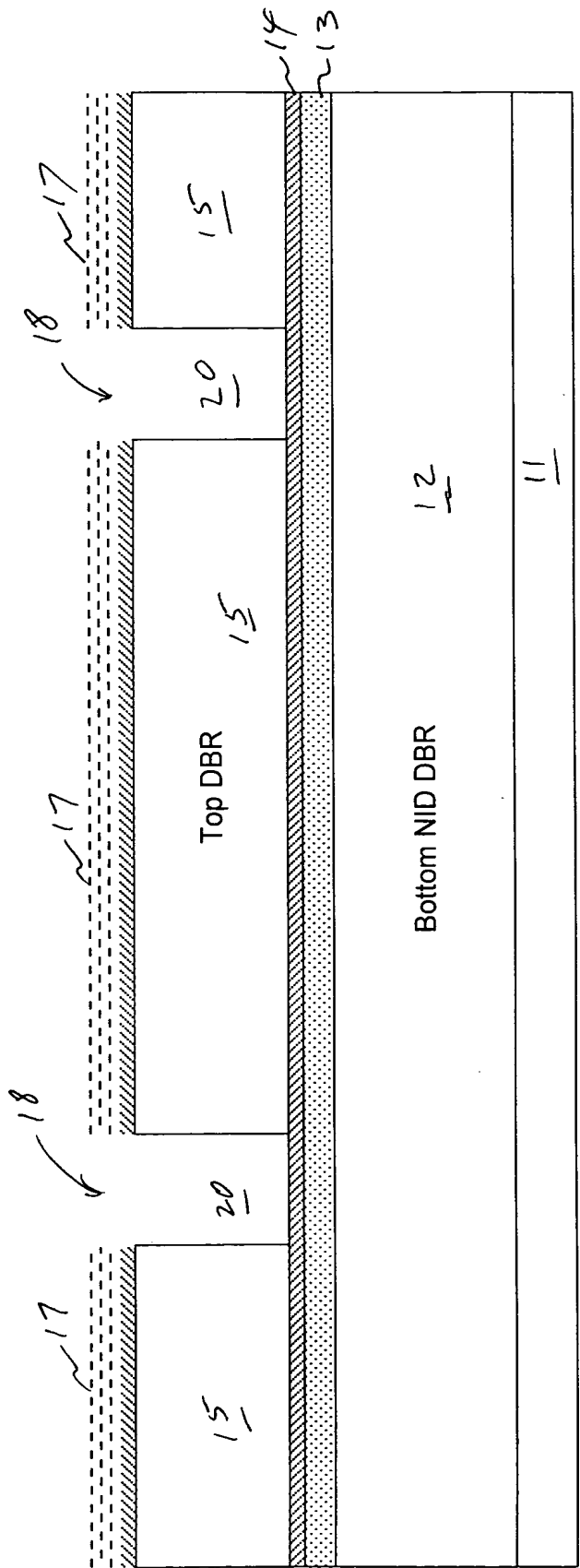


FIGURE 4

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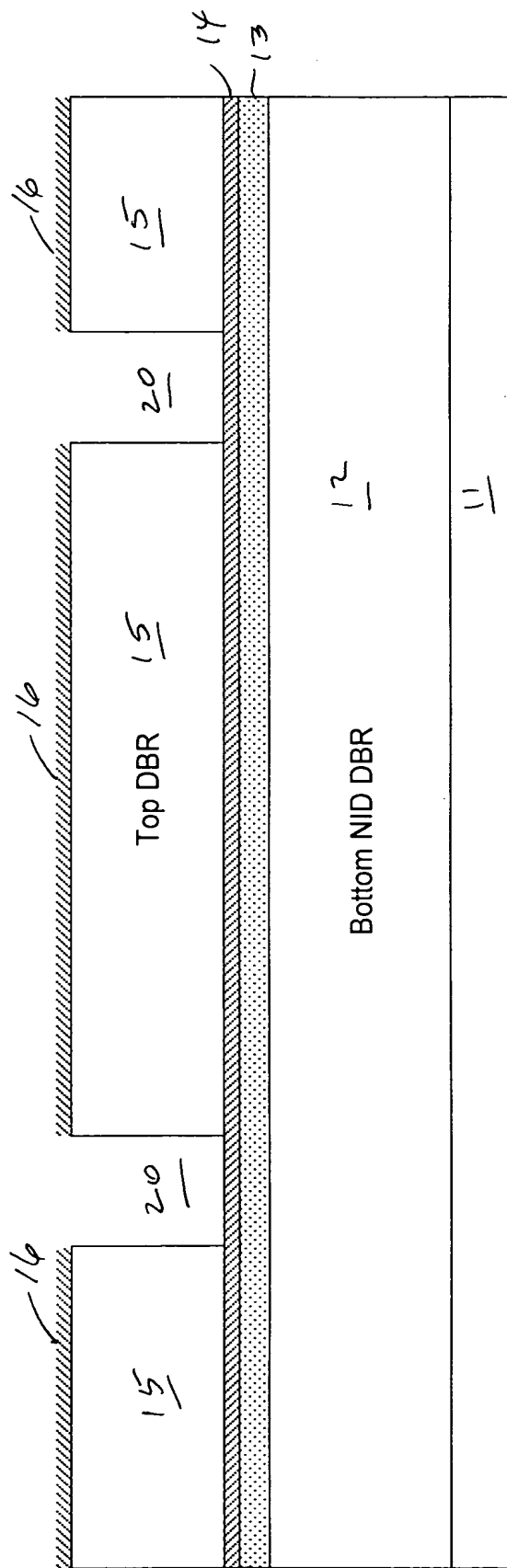


FIGURE 5

10

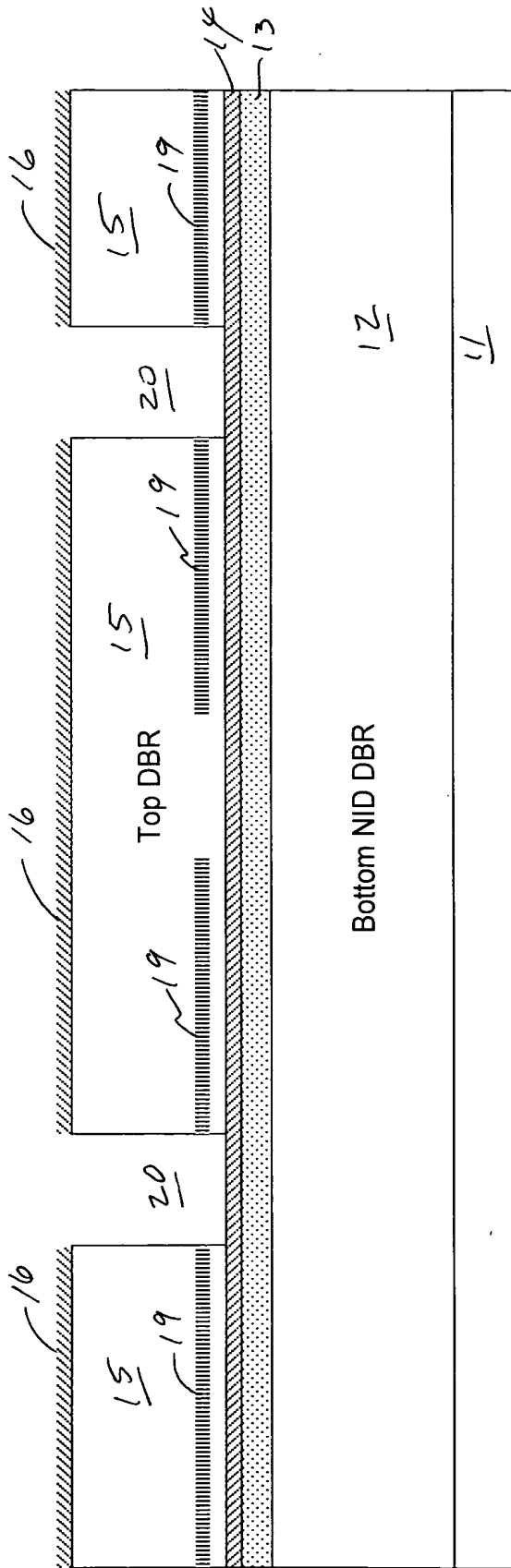


FIGURE 6a

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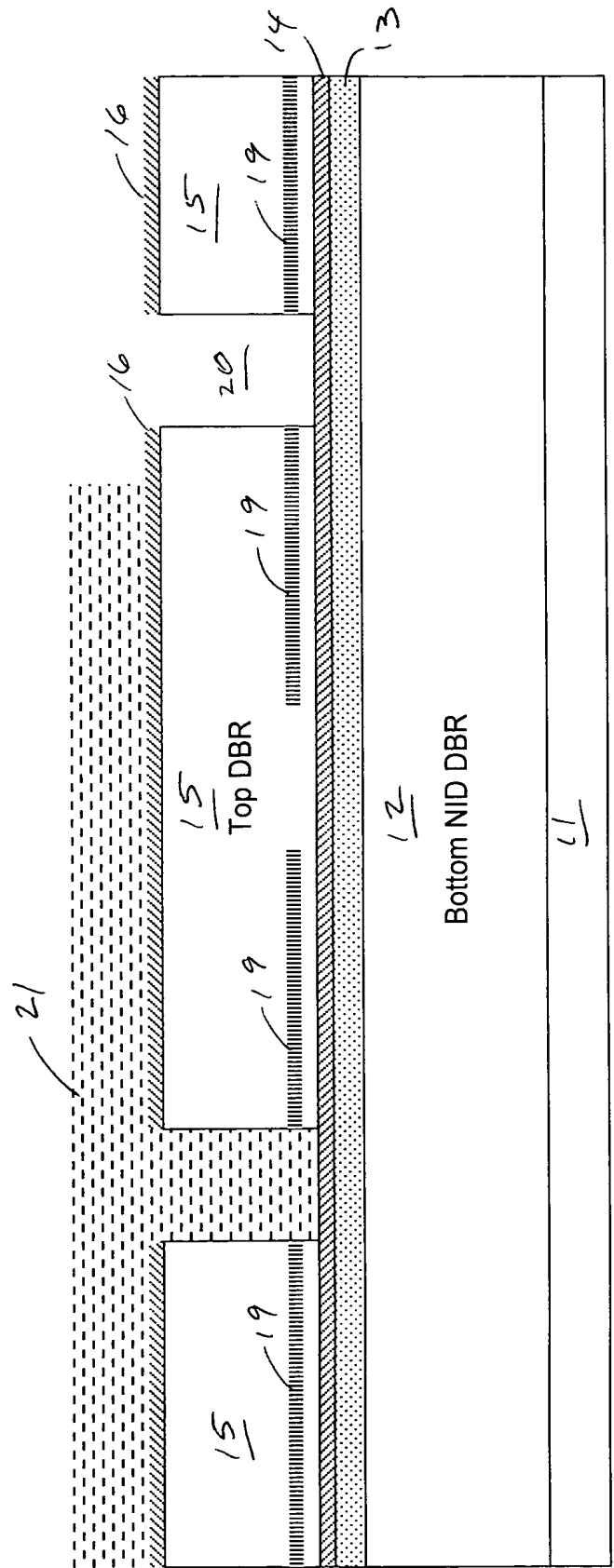


FIGURE 7

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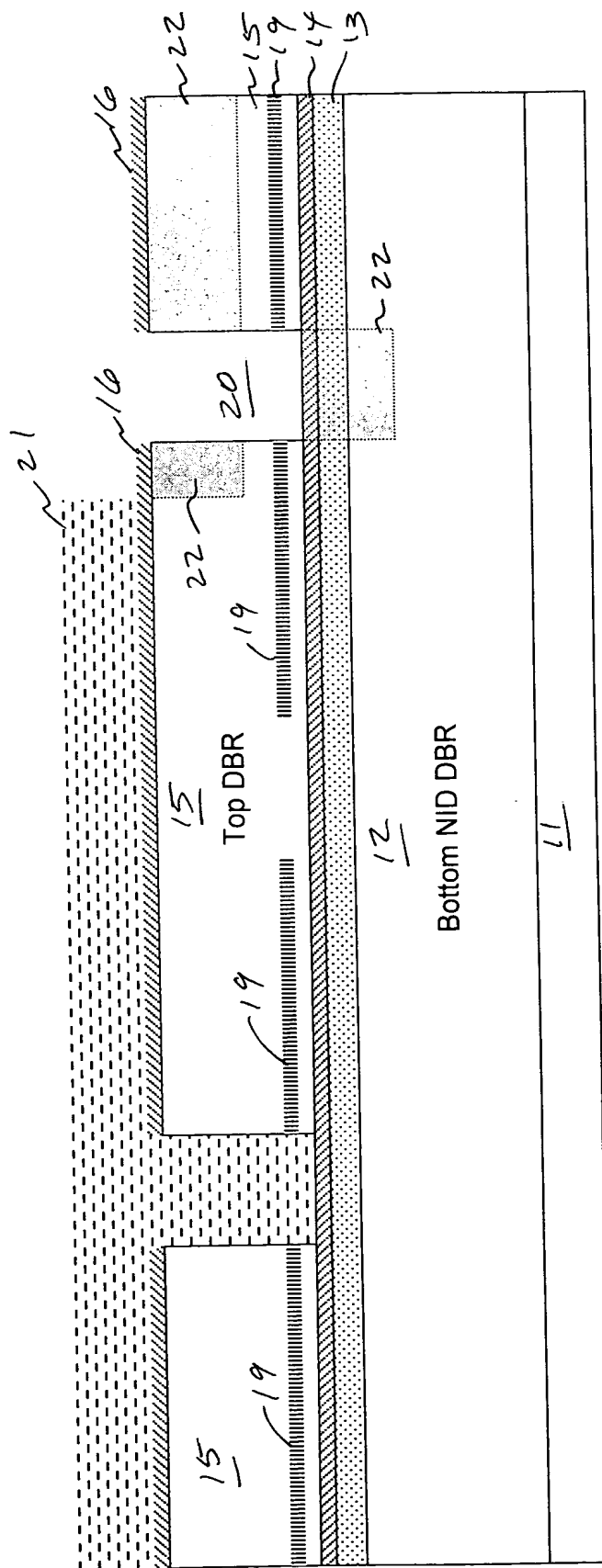


FIGURE 8

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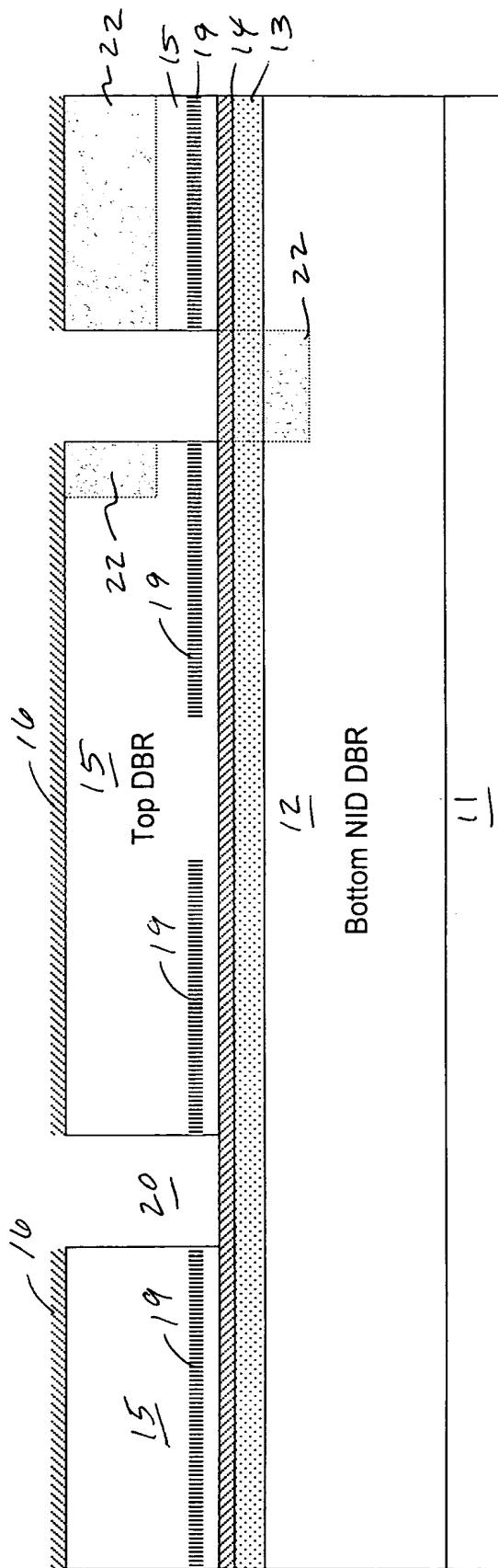


FIGURE 9

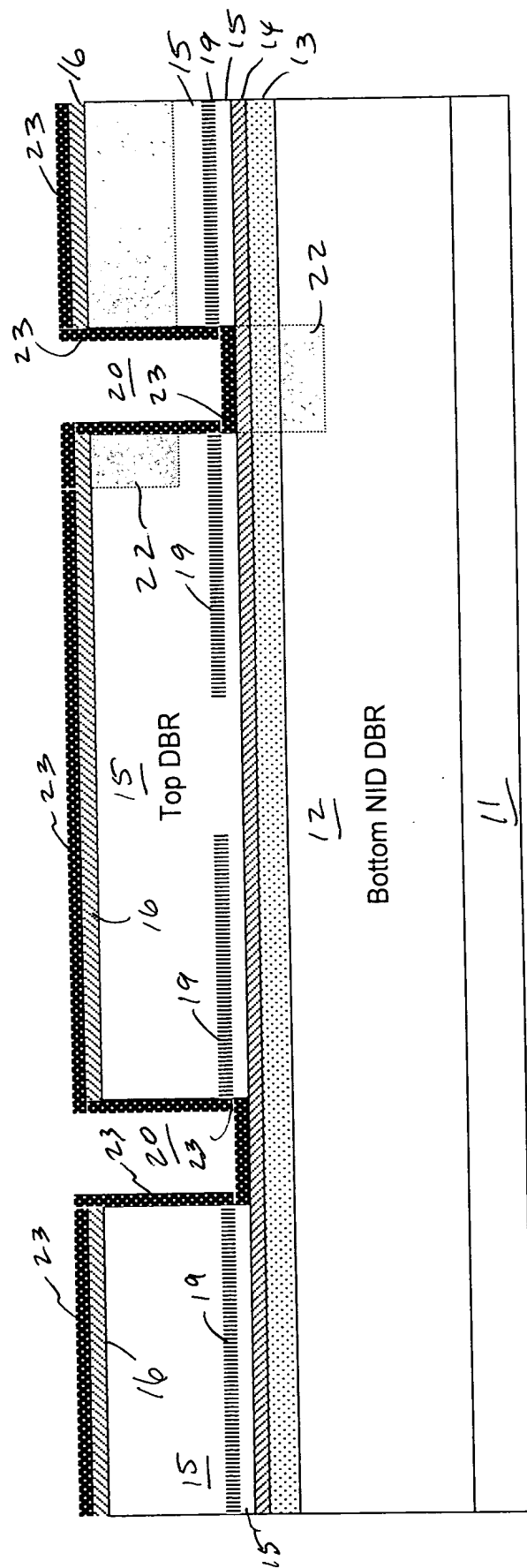


Figure 10

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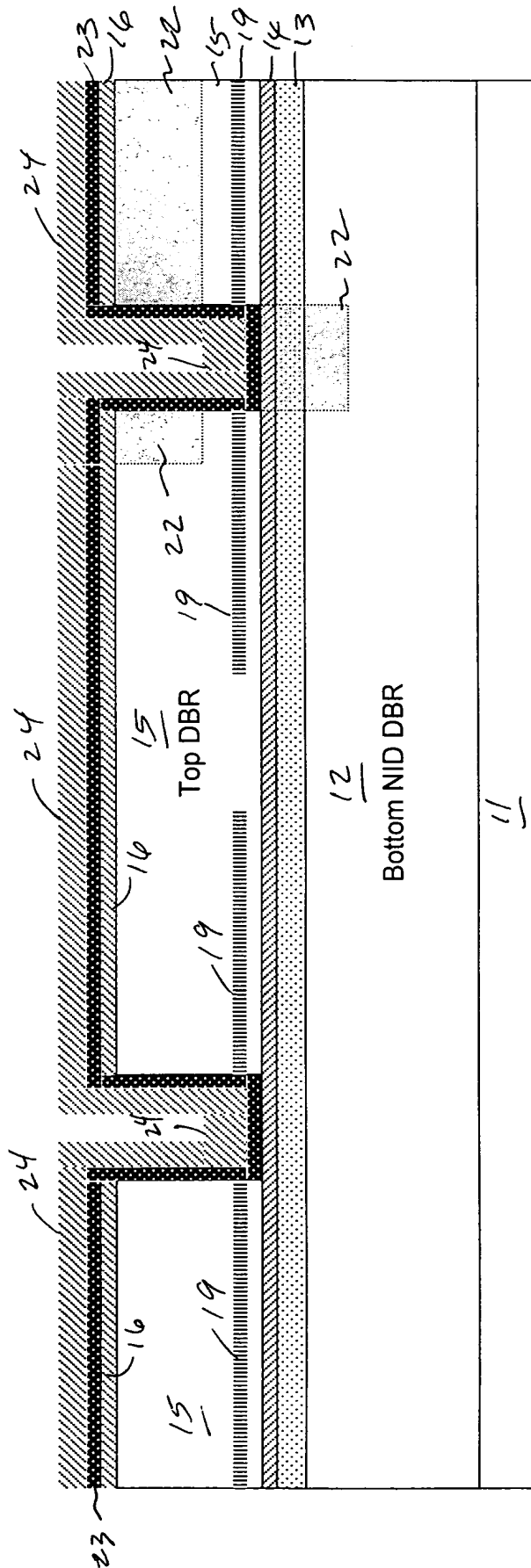


FIGURE 11

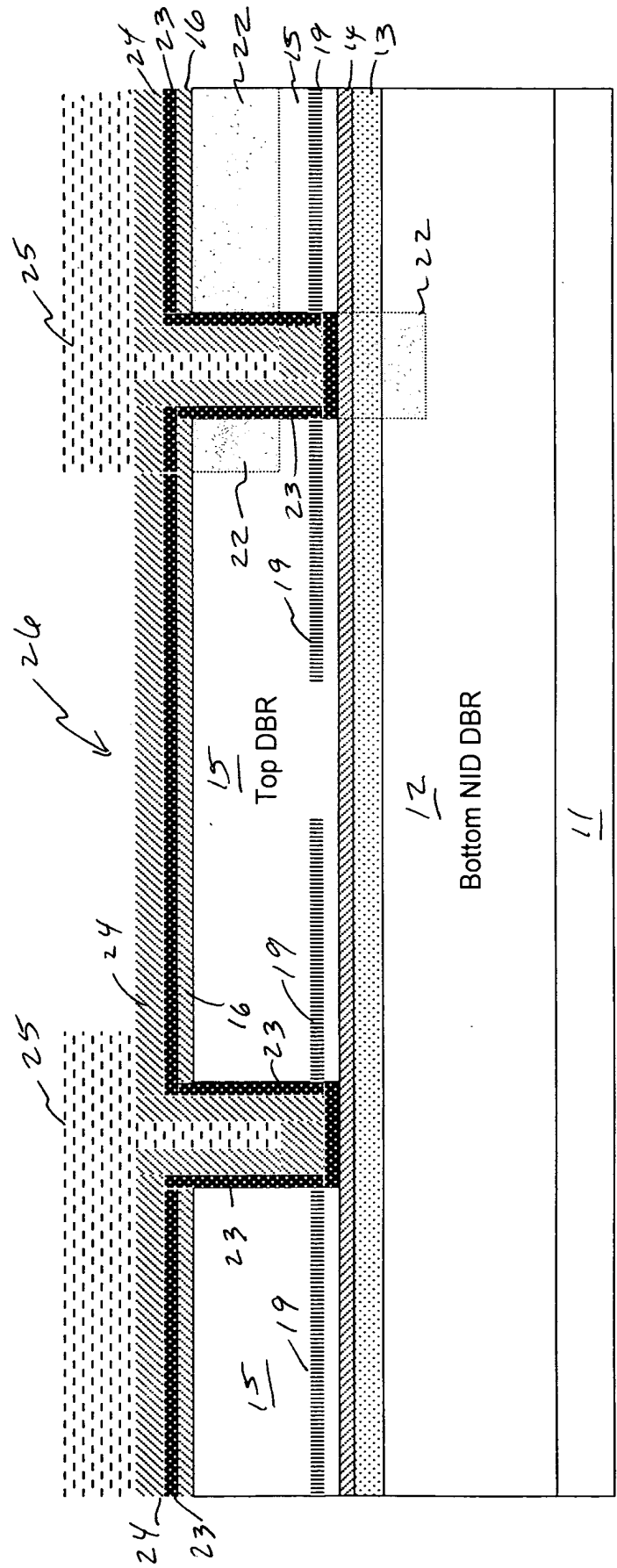


FIGURE 12

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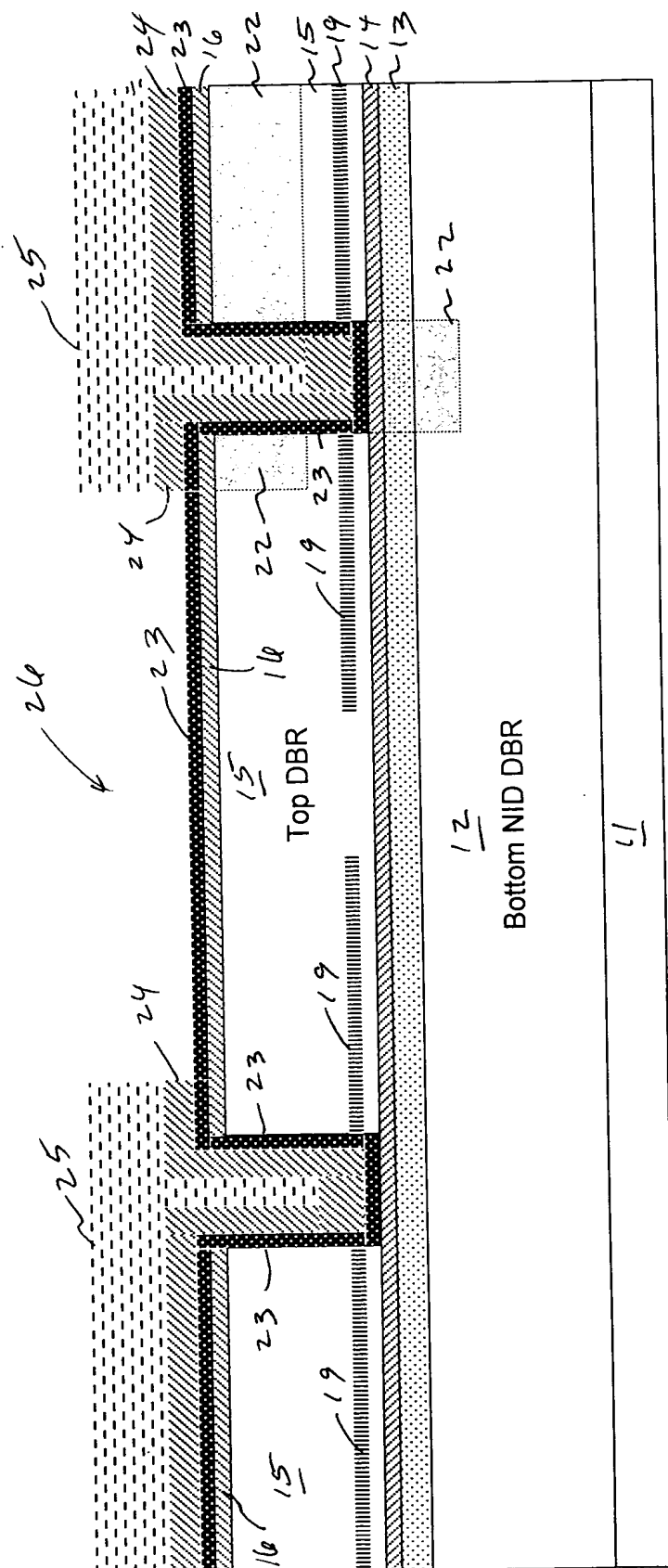


FIGURE 13

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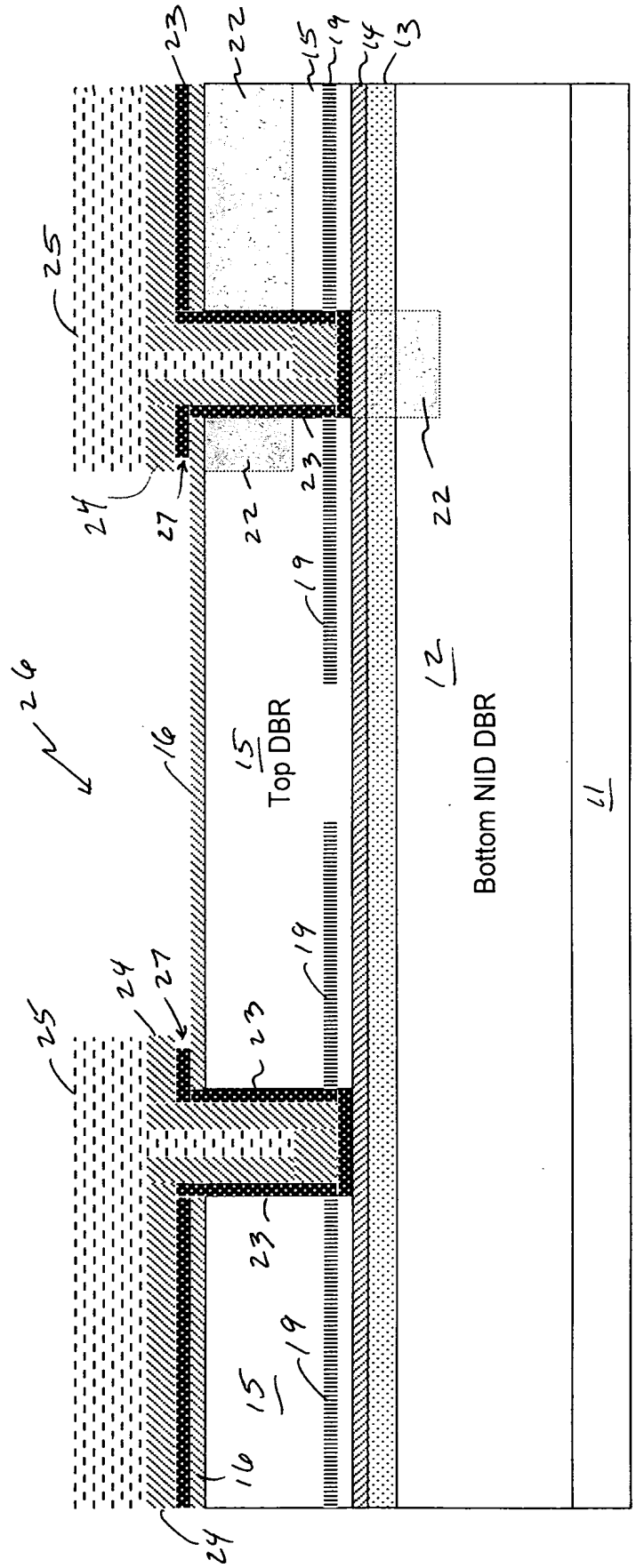


FIGURE 14

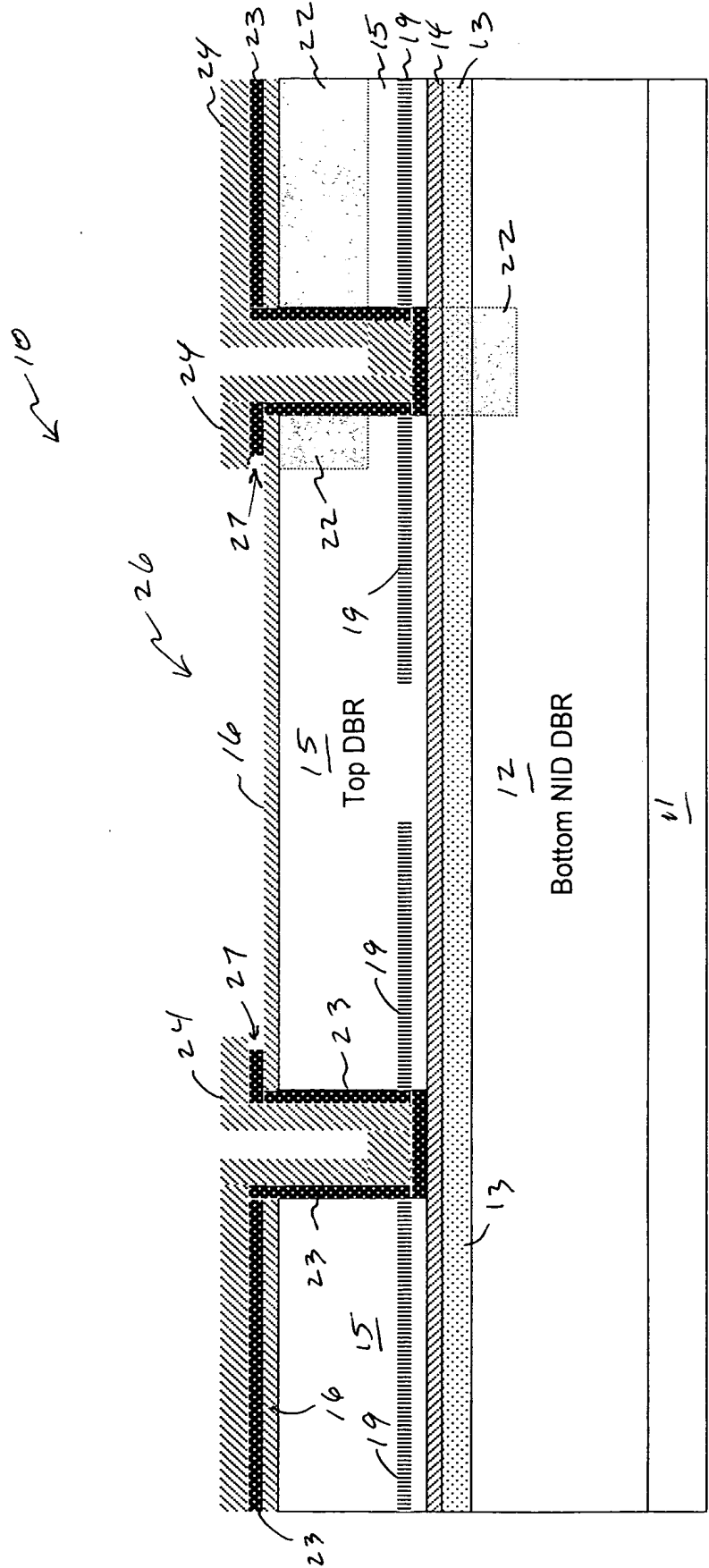
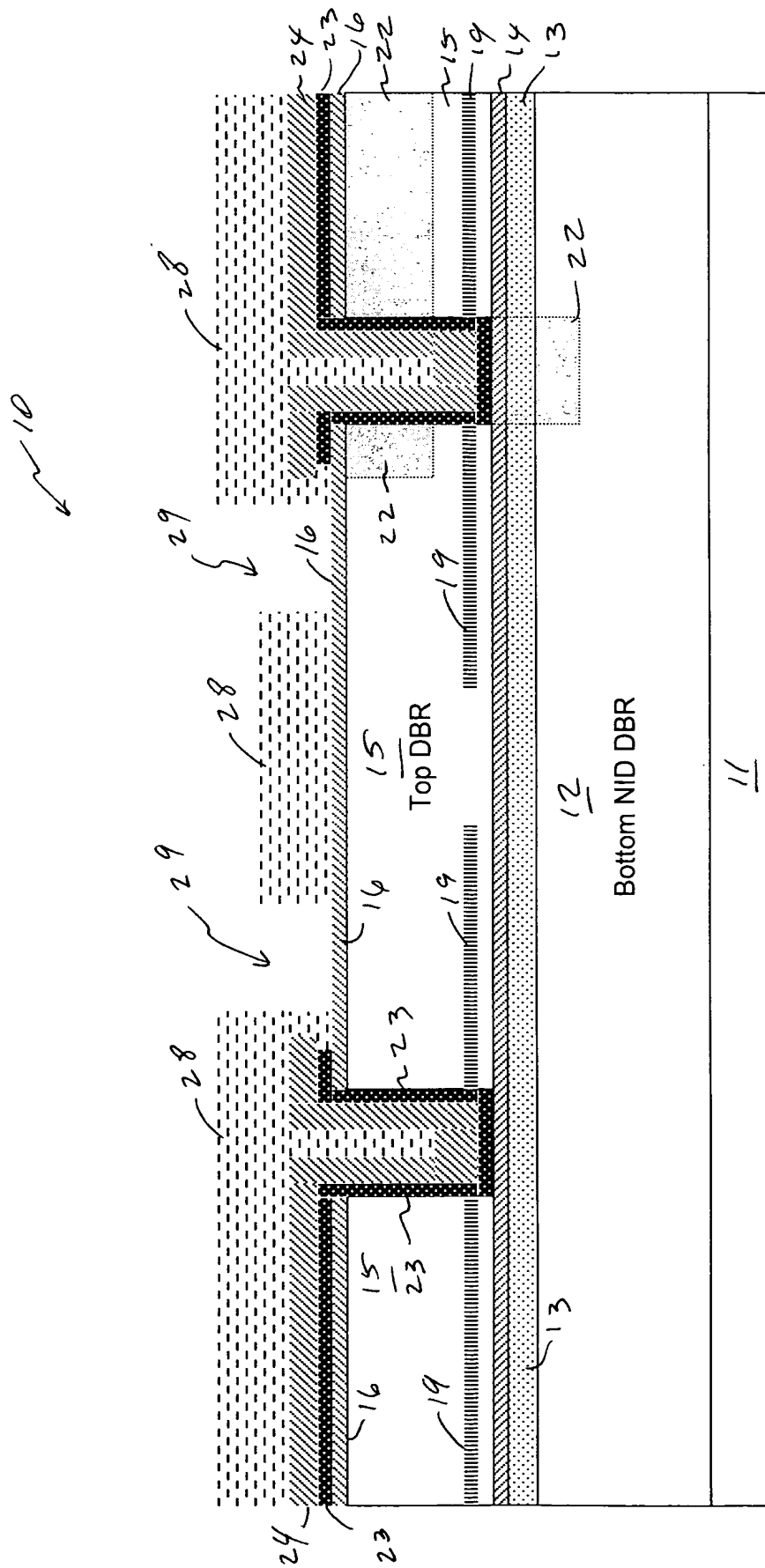


FIGURE 15



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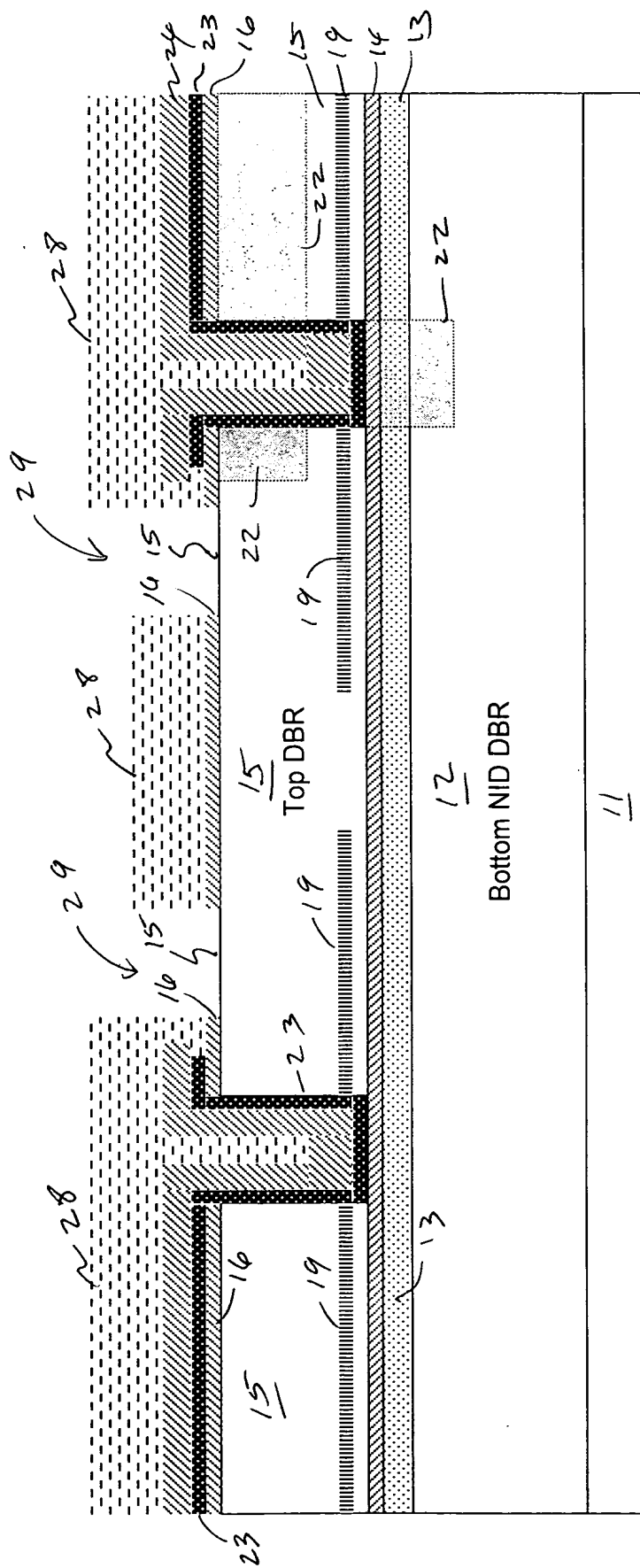


FIGURE 17

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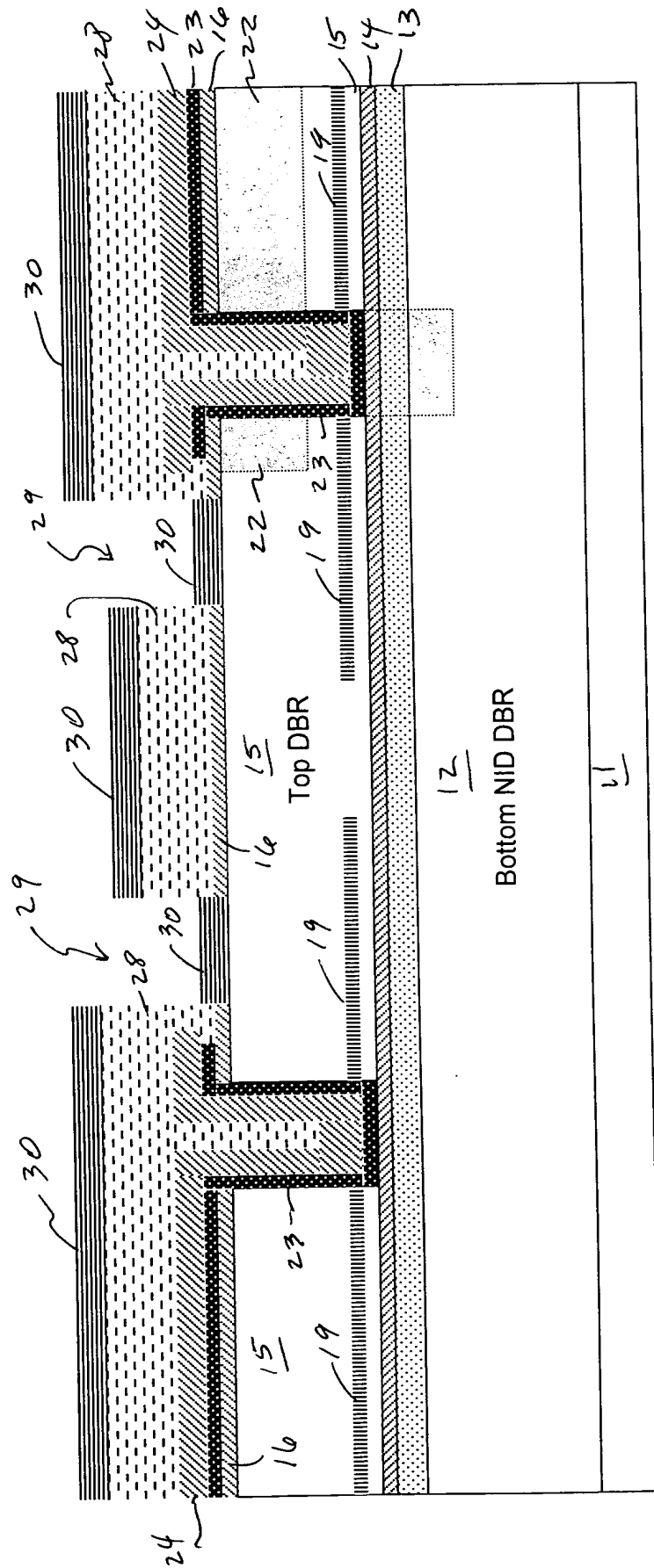


FIGURE 18

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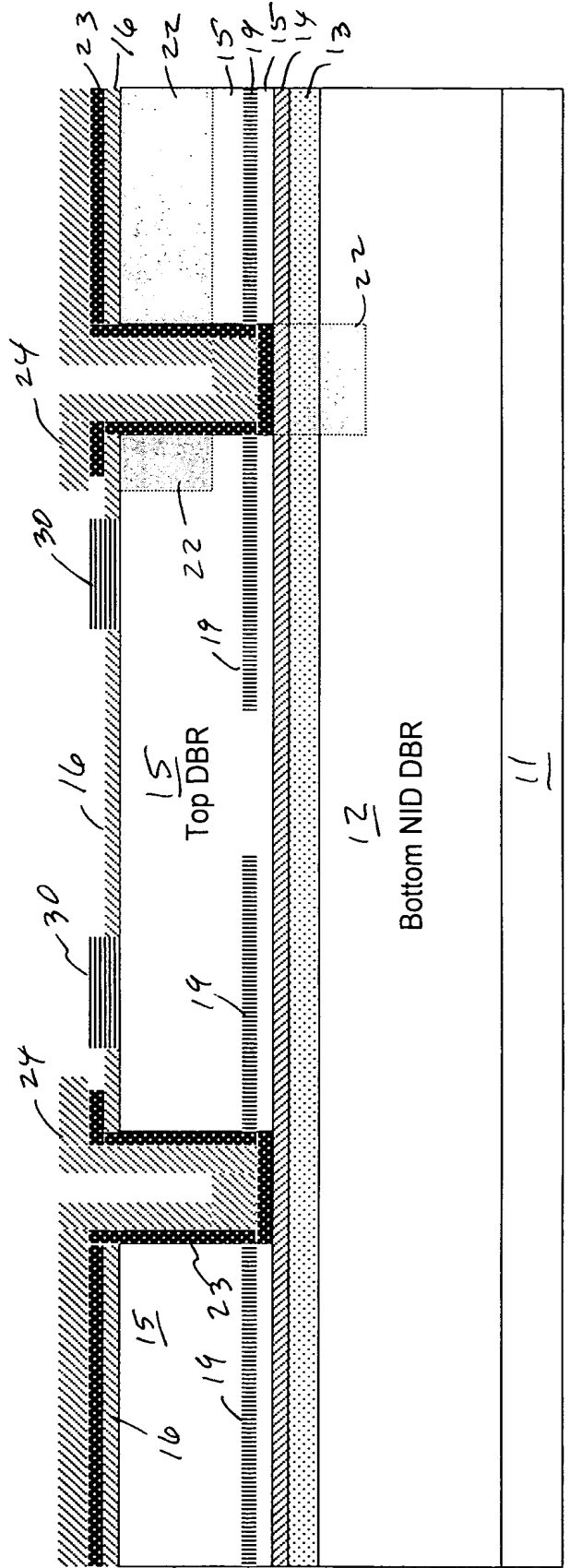
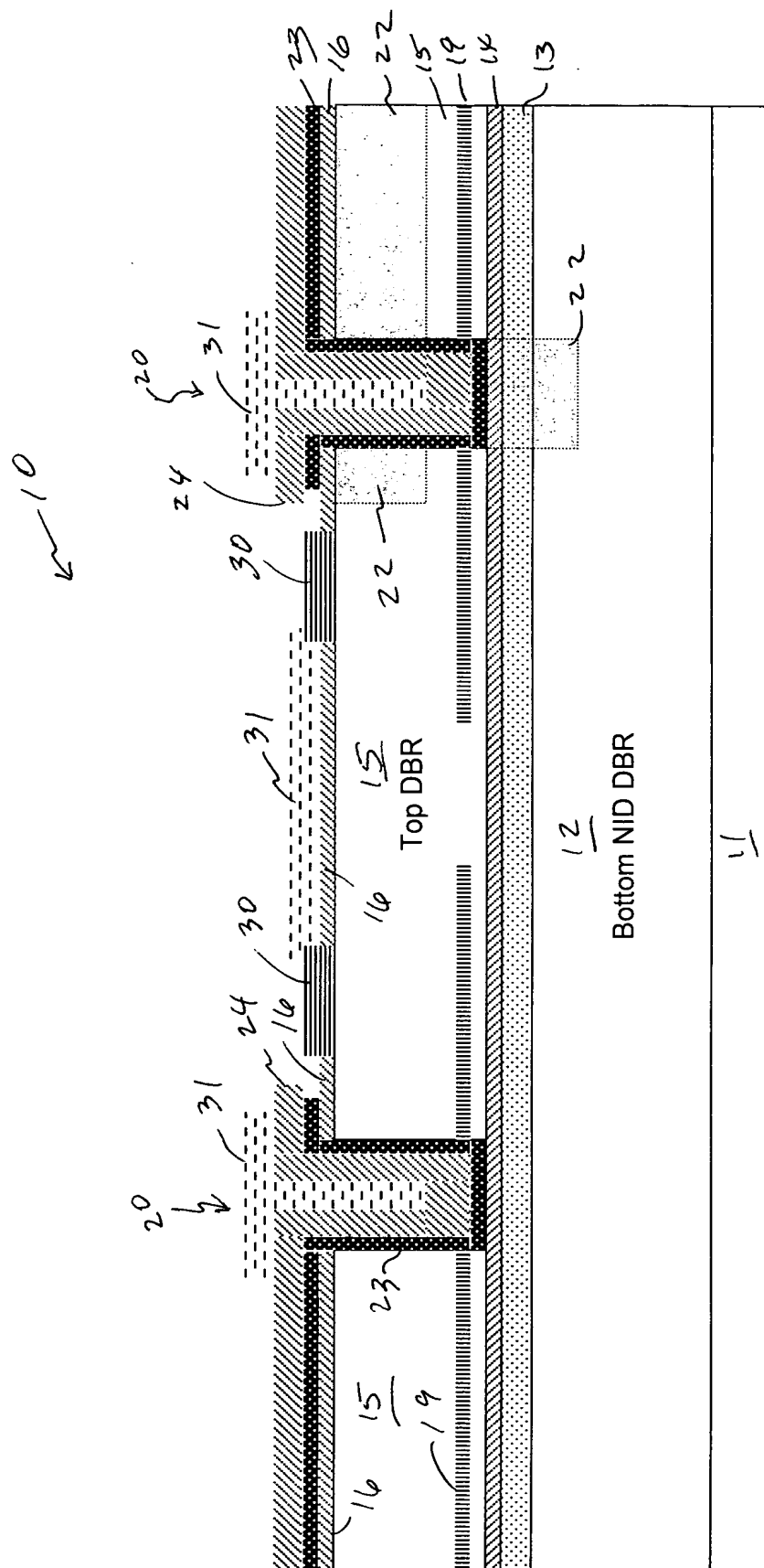
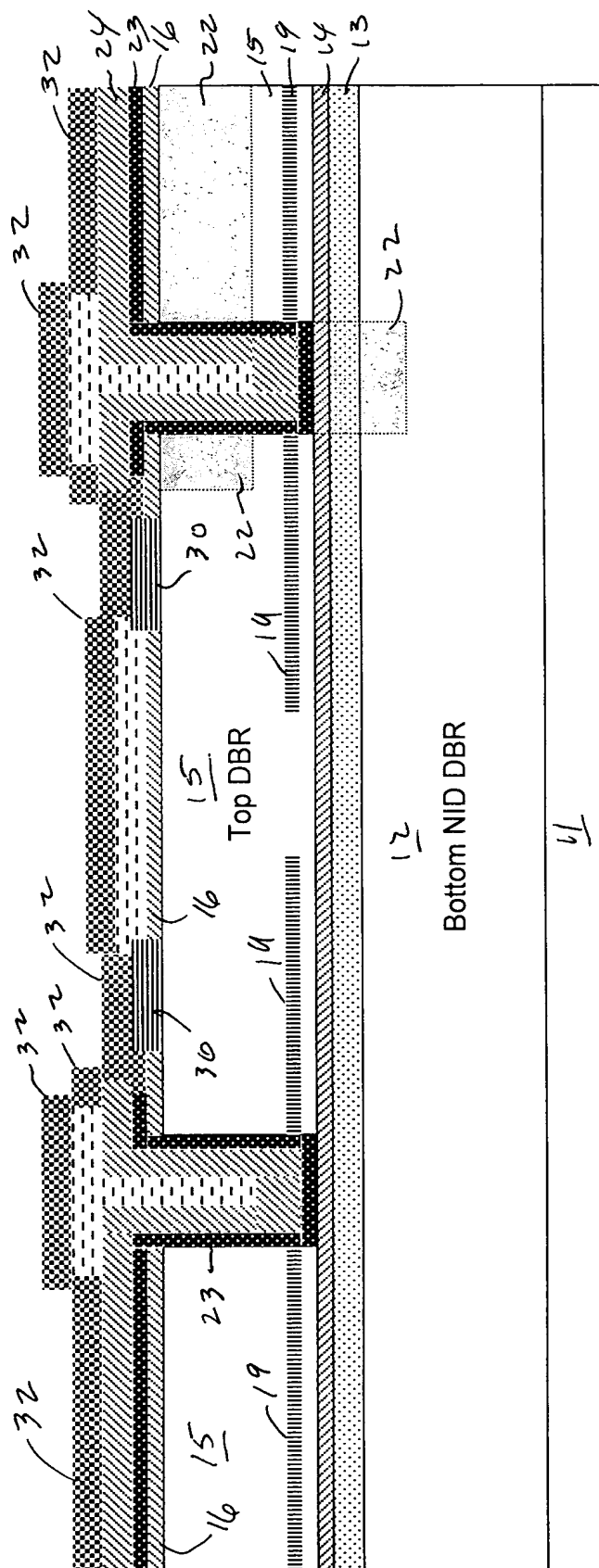


FIGURE 19





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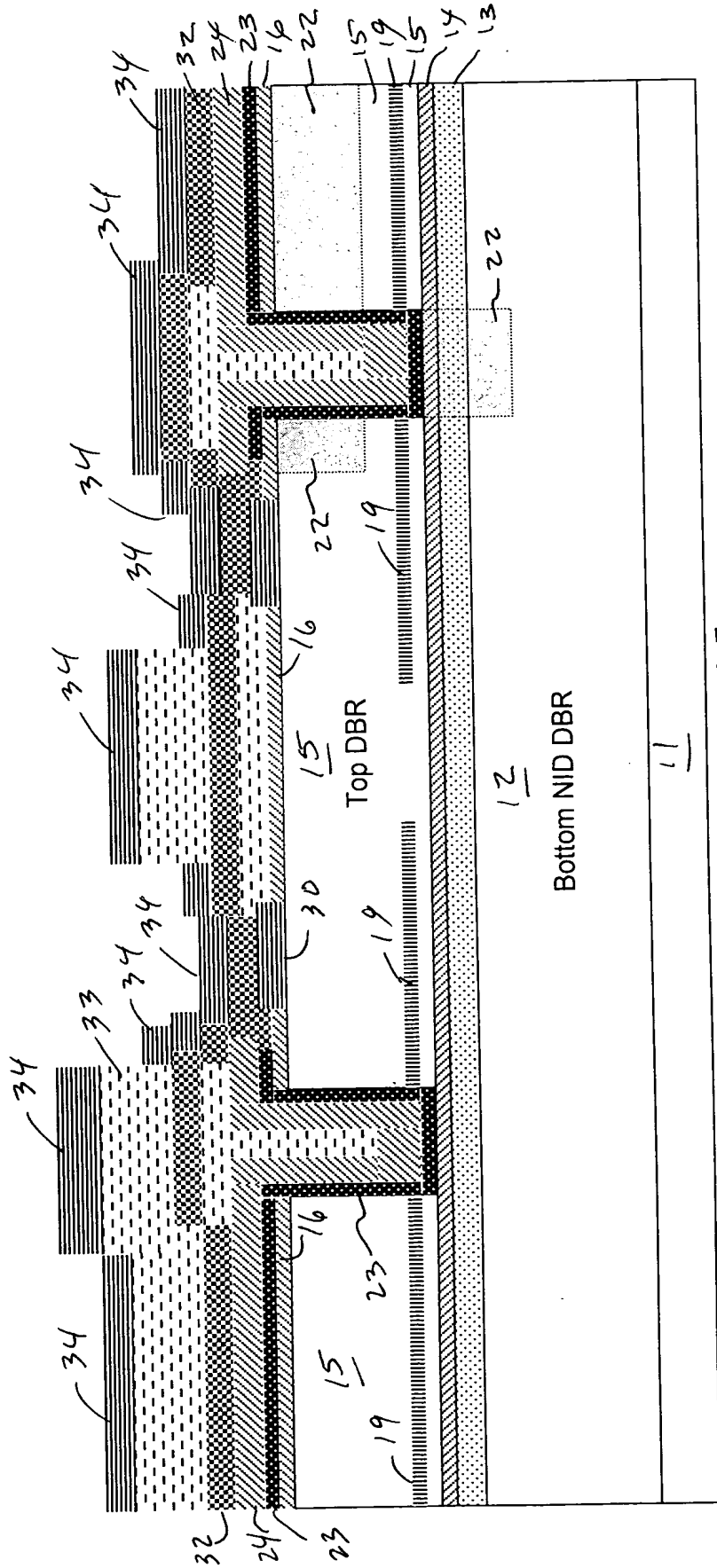


FIGURE 23

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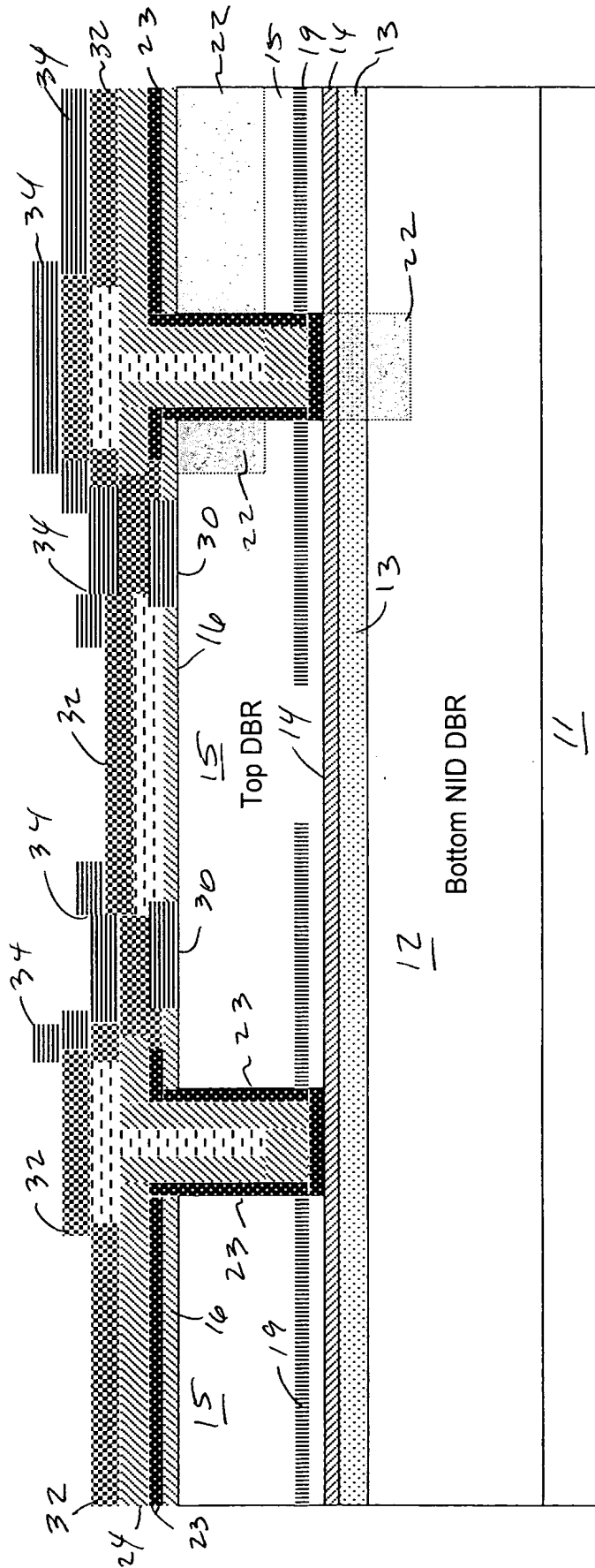


FIGURE 24

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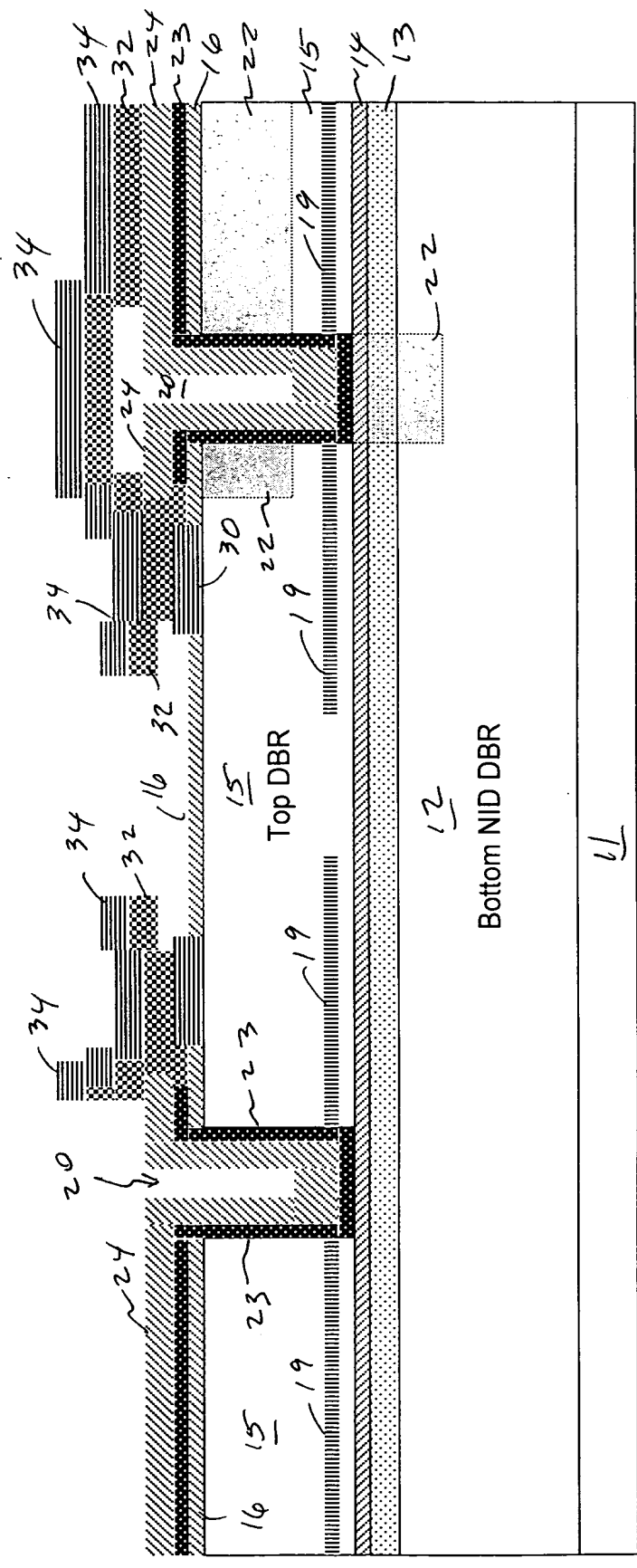


FIGURE 26

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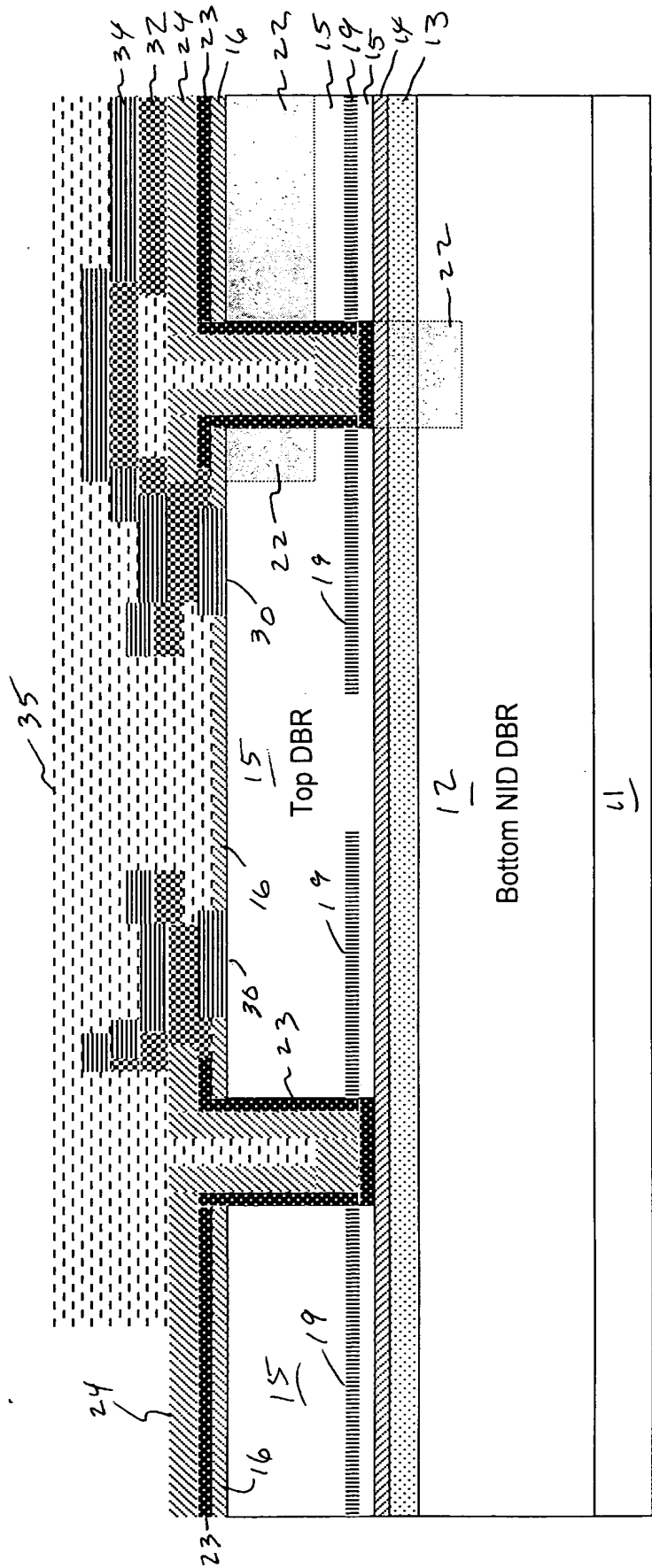


FIGURE 27

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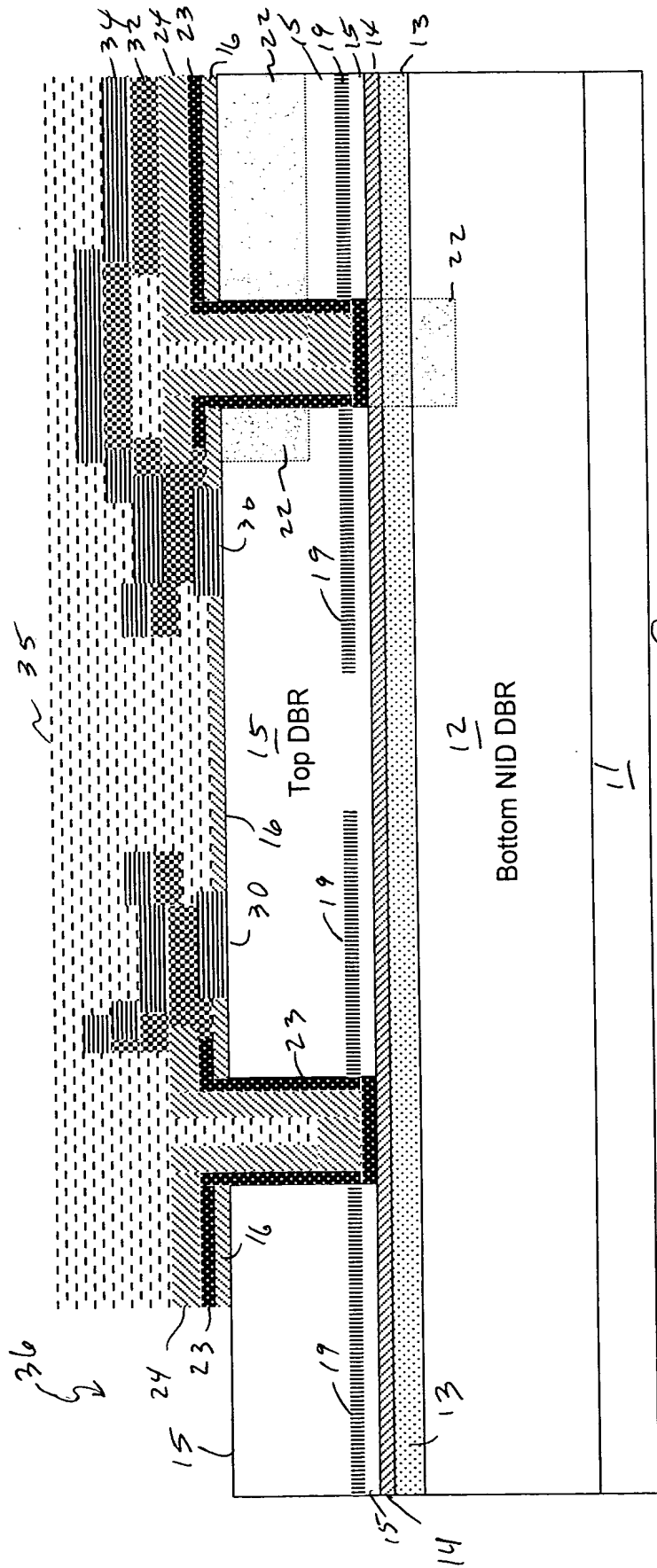
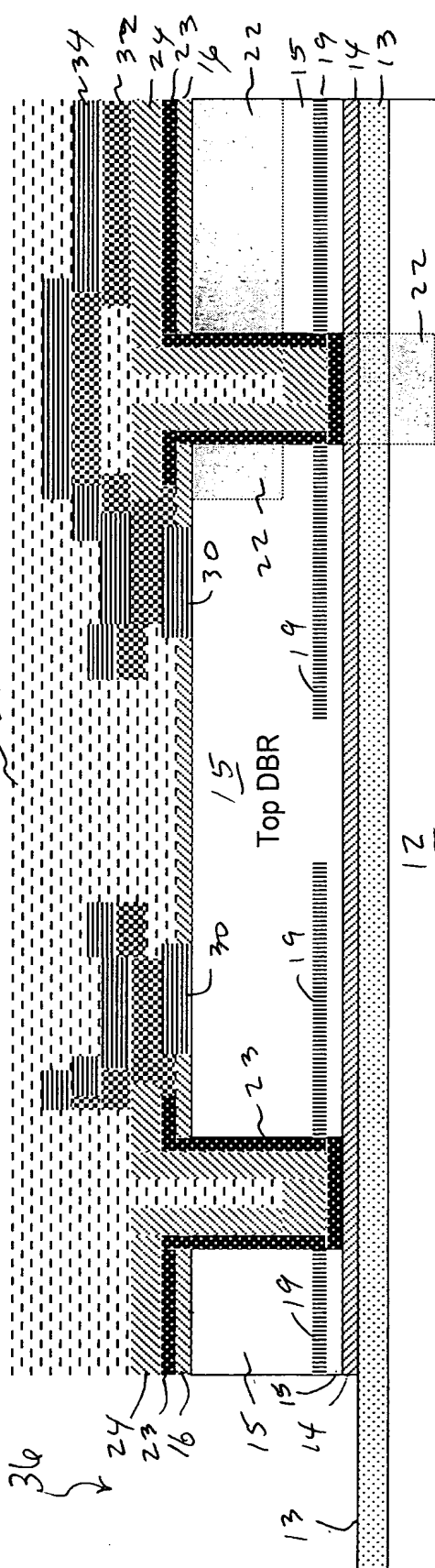


FIGURE 28

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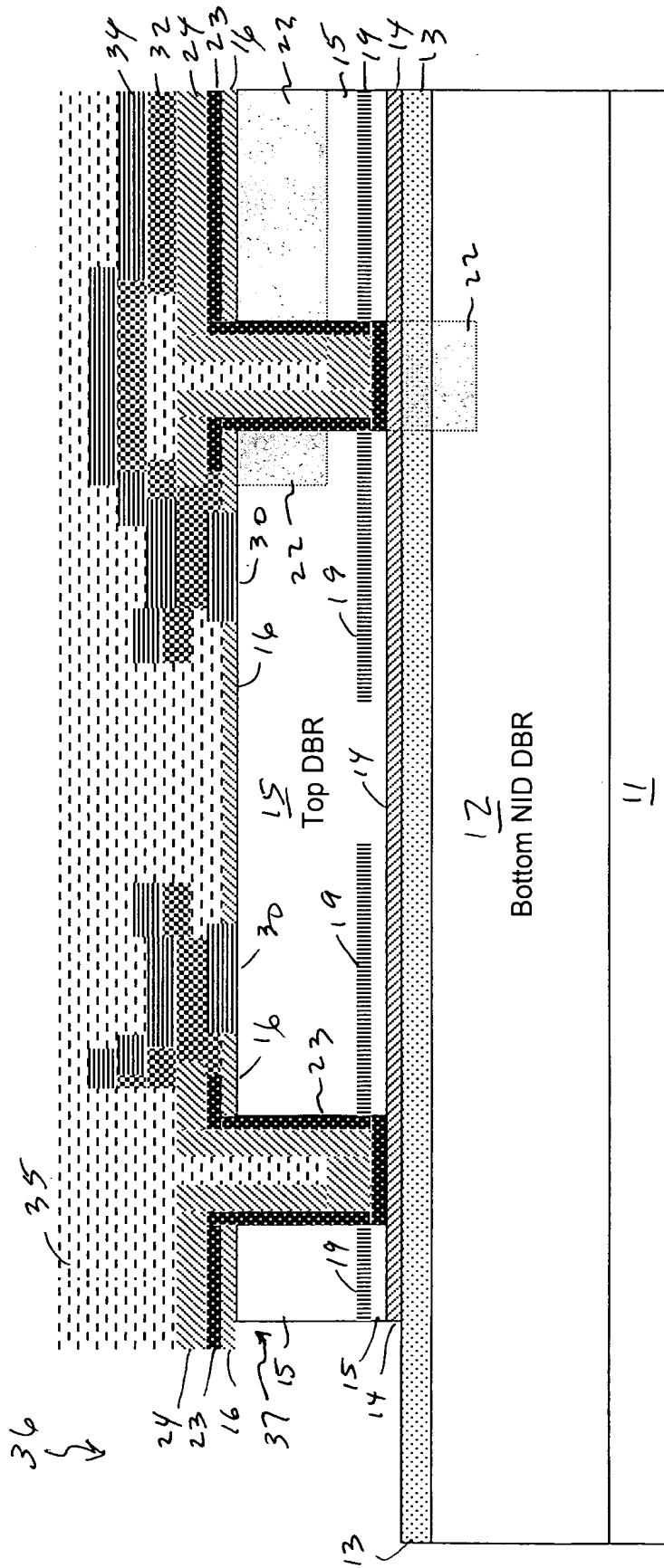
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Bottom NID DBR

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FIGURE 29

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FIGURE 30

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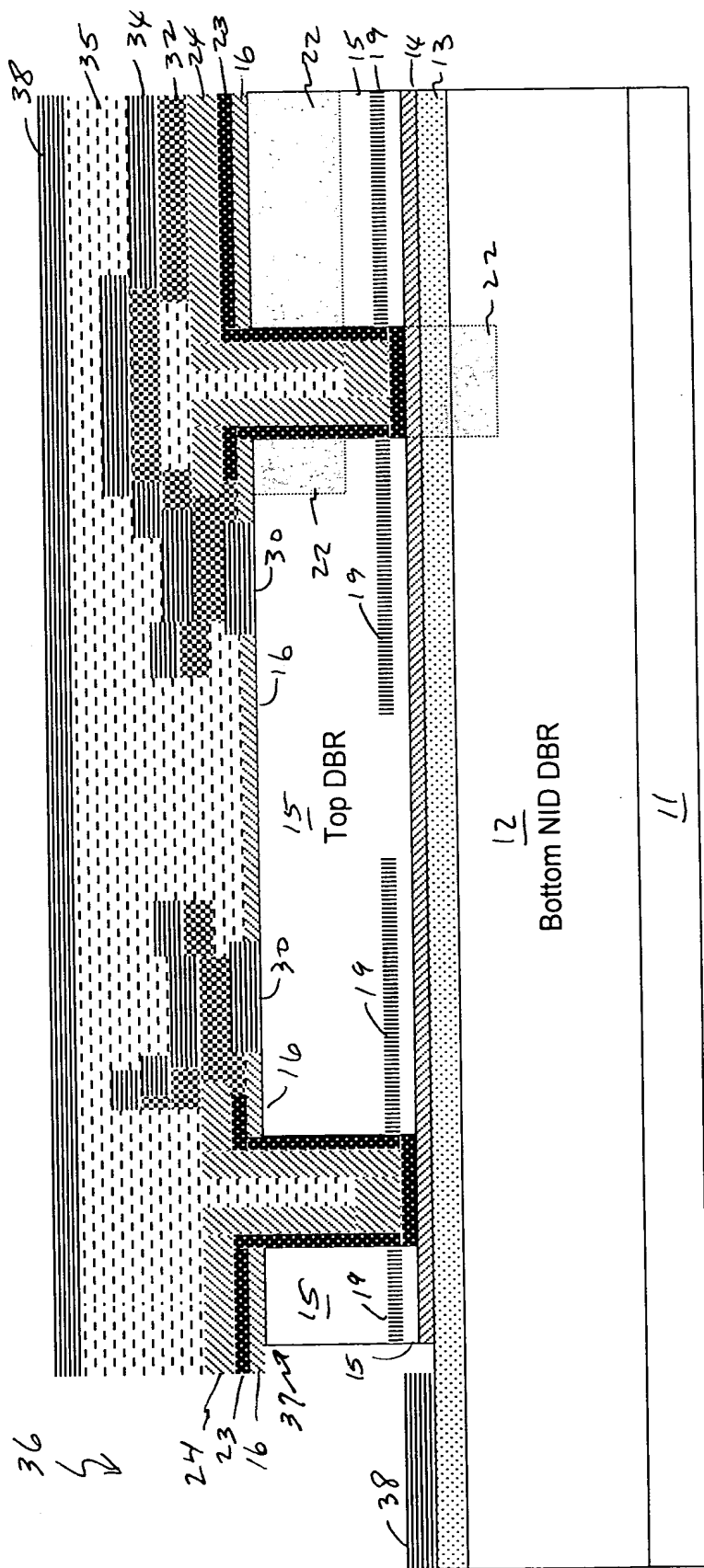


FIGURE 31

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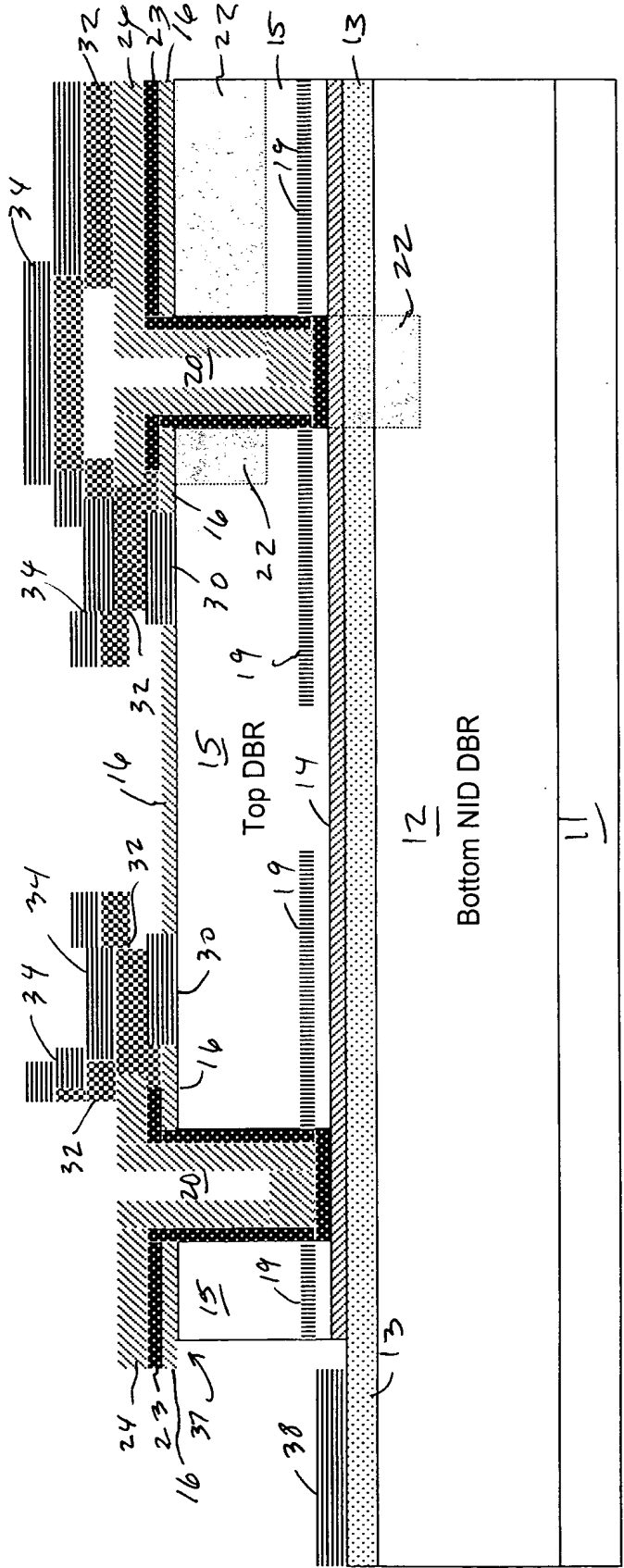


FIGURE 32

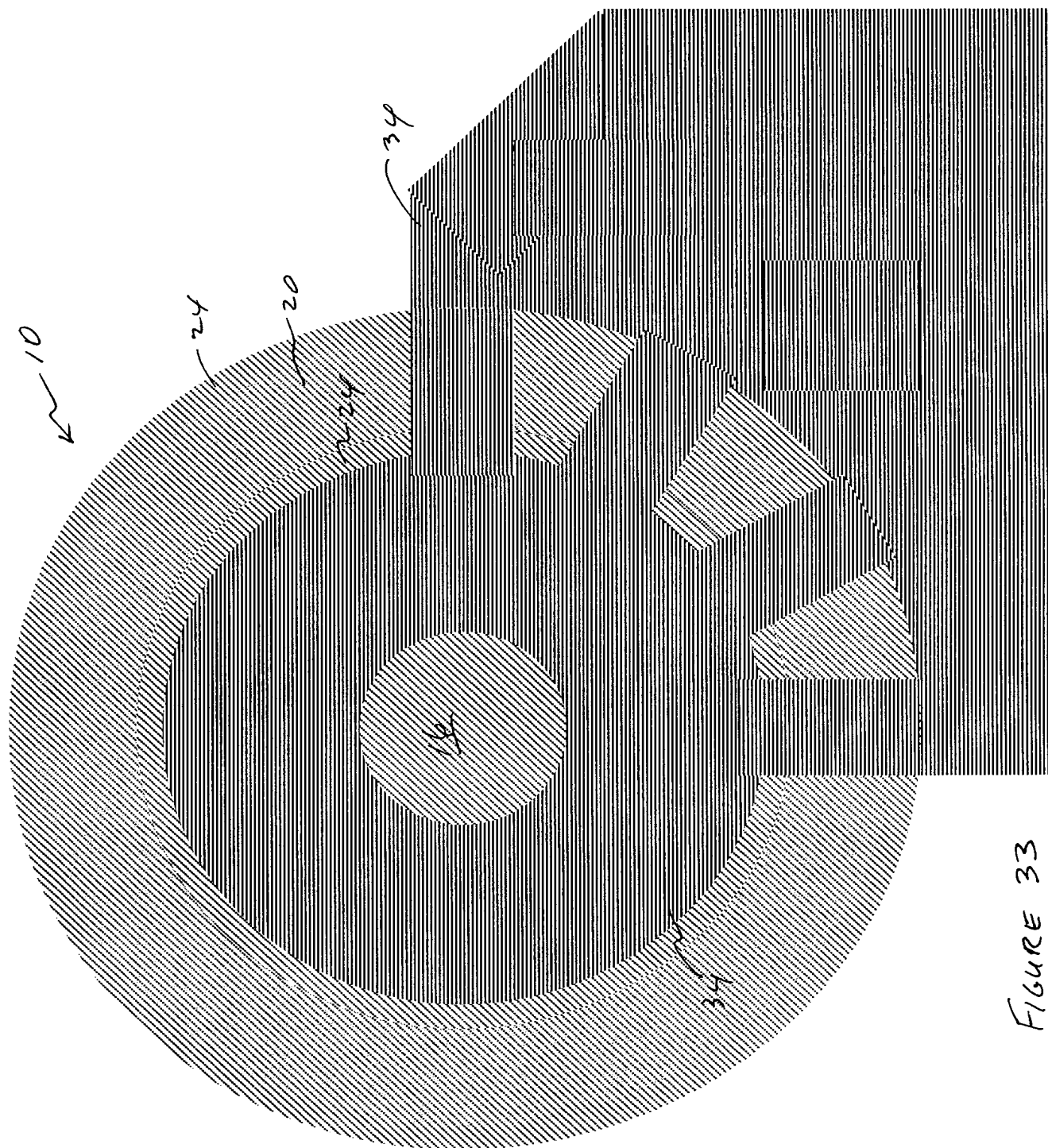


FIGURE 33

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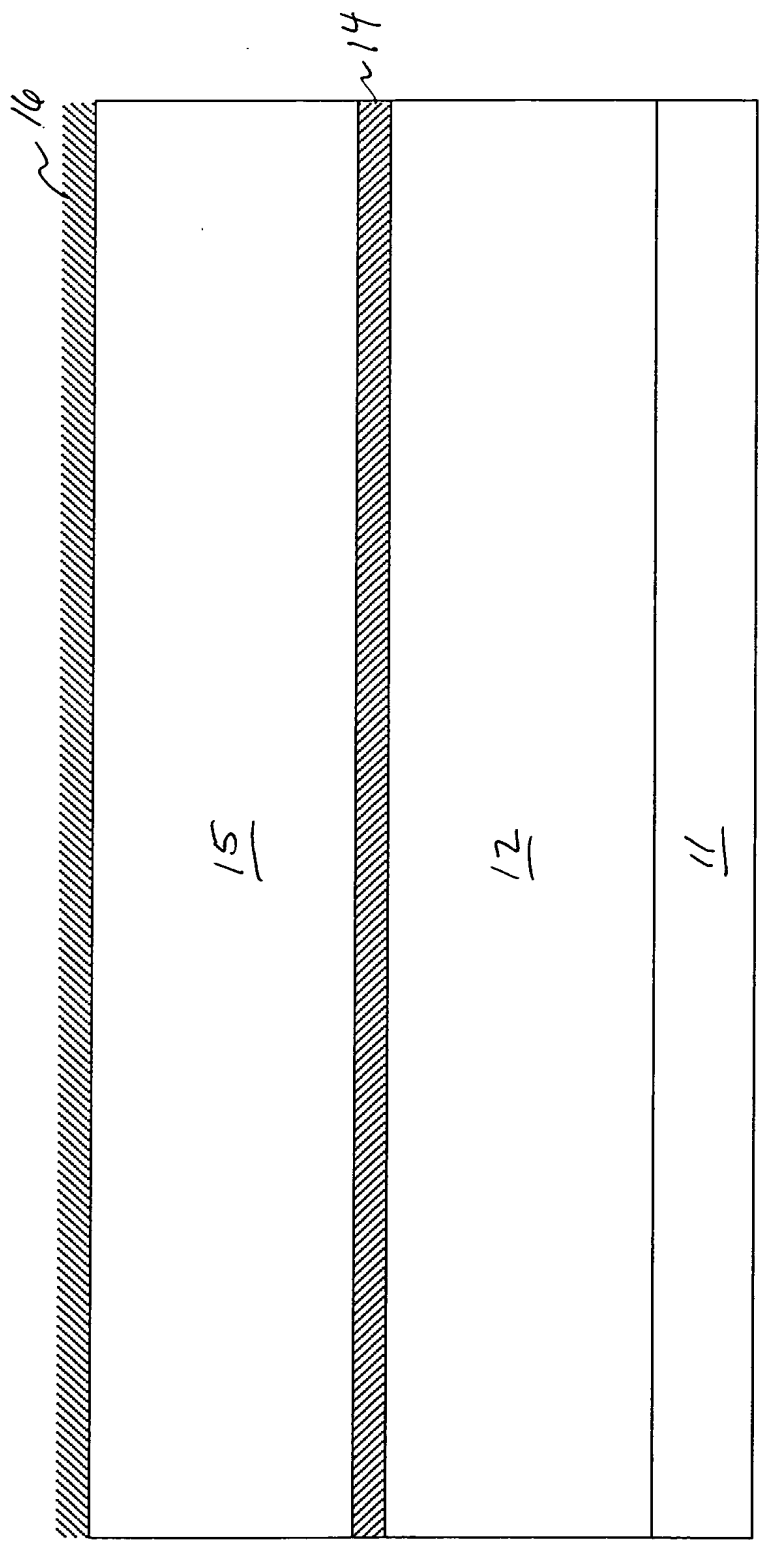


FIGURE 34

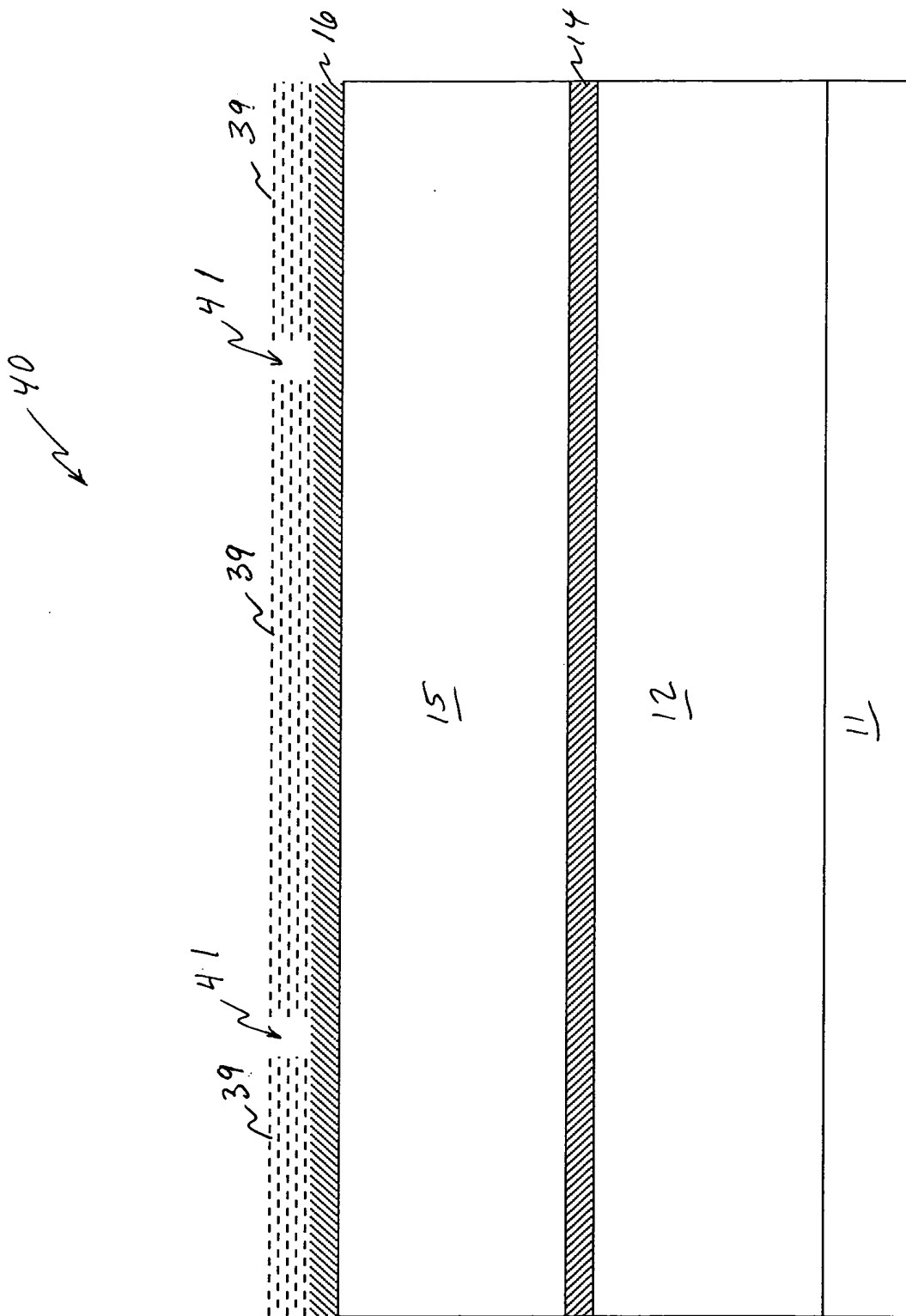


FIGURE 35

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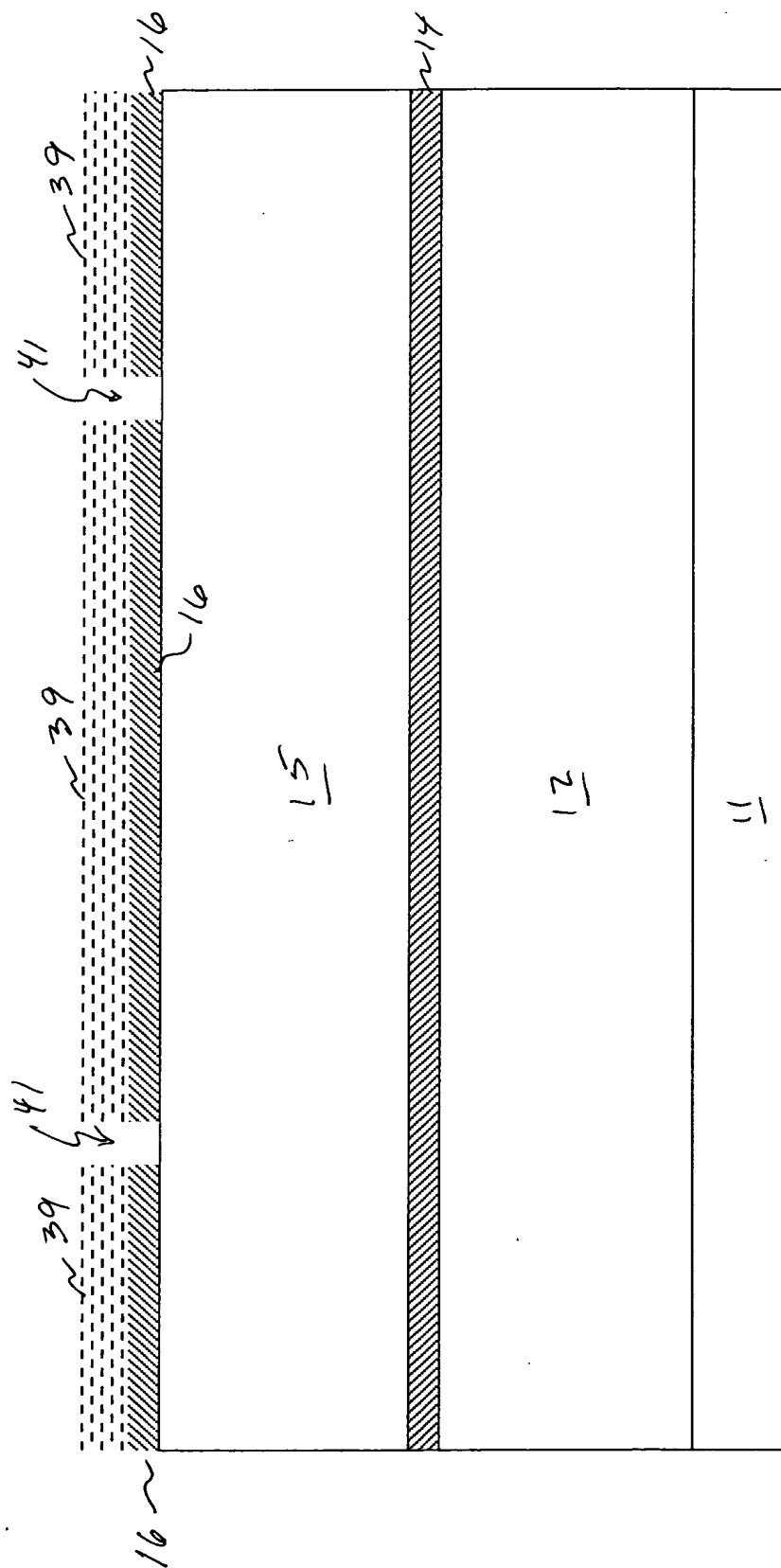


FIGURE 36

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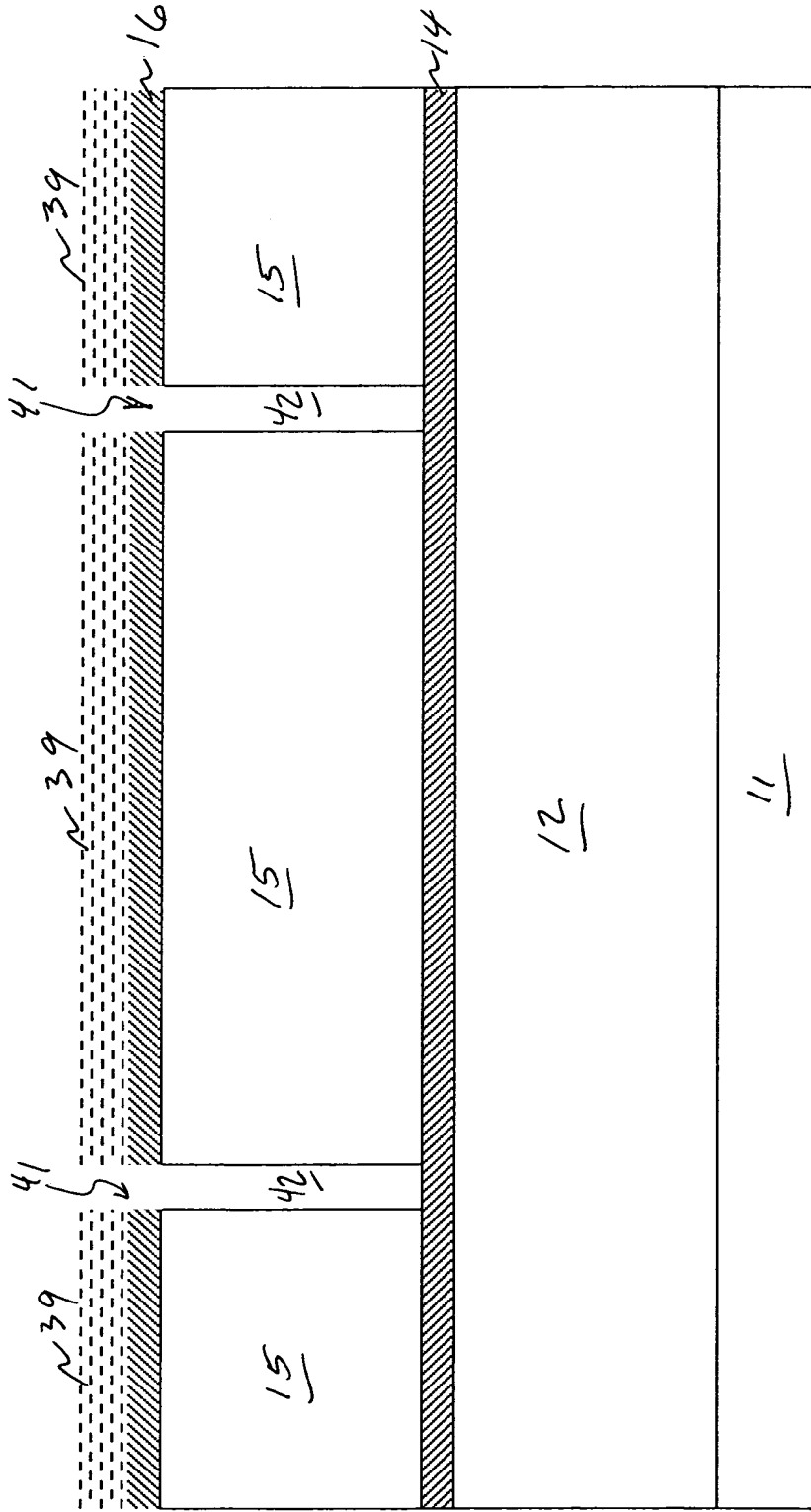


FIGURE 37

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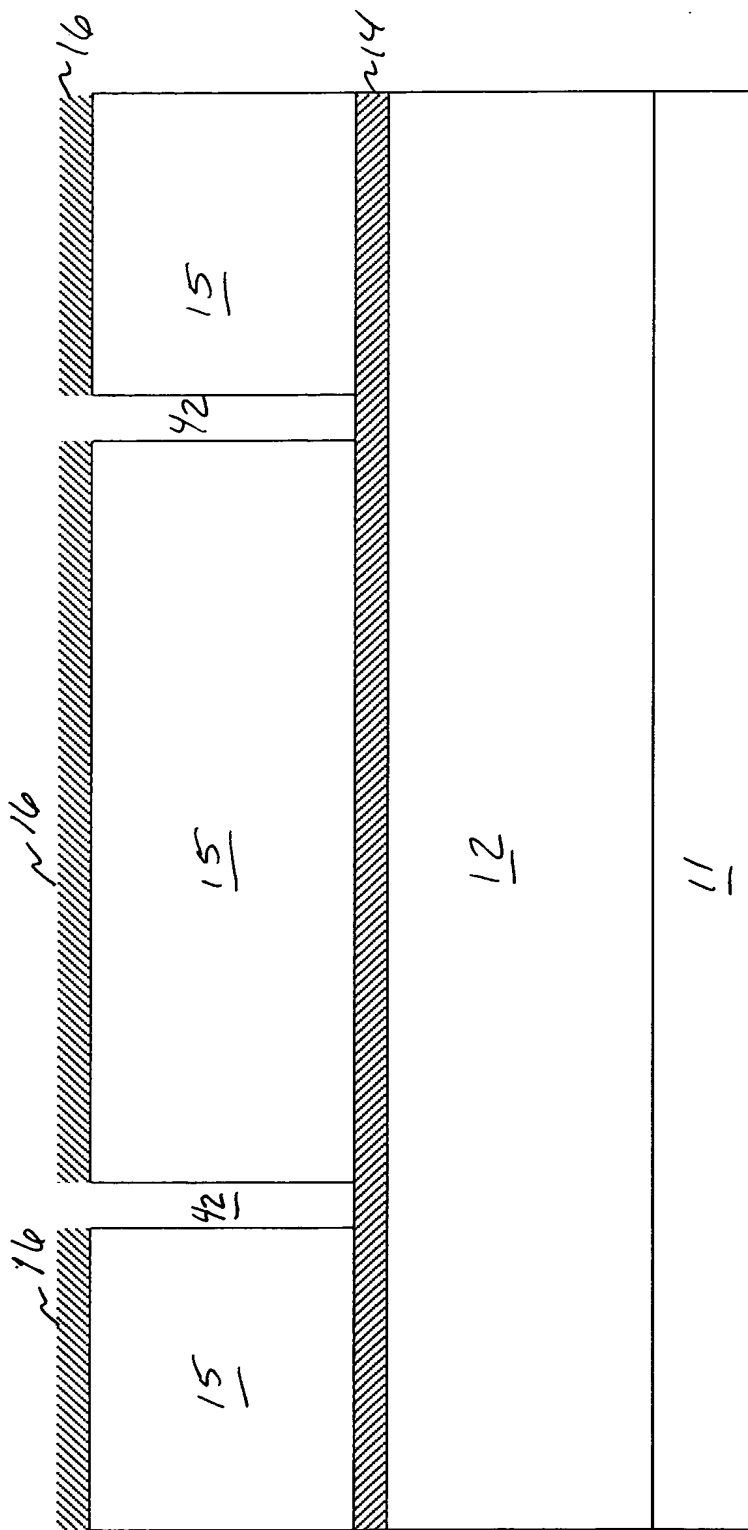


FIGURE 38

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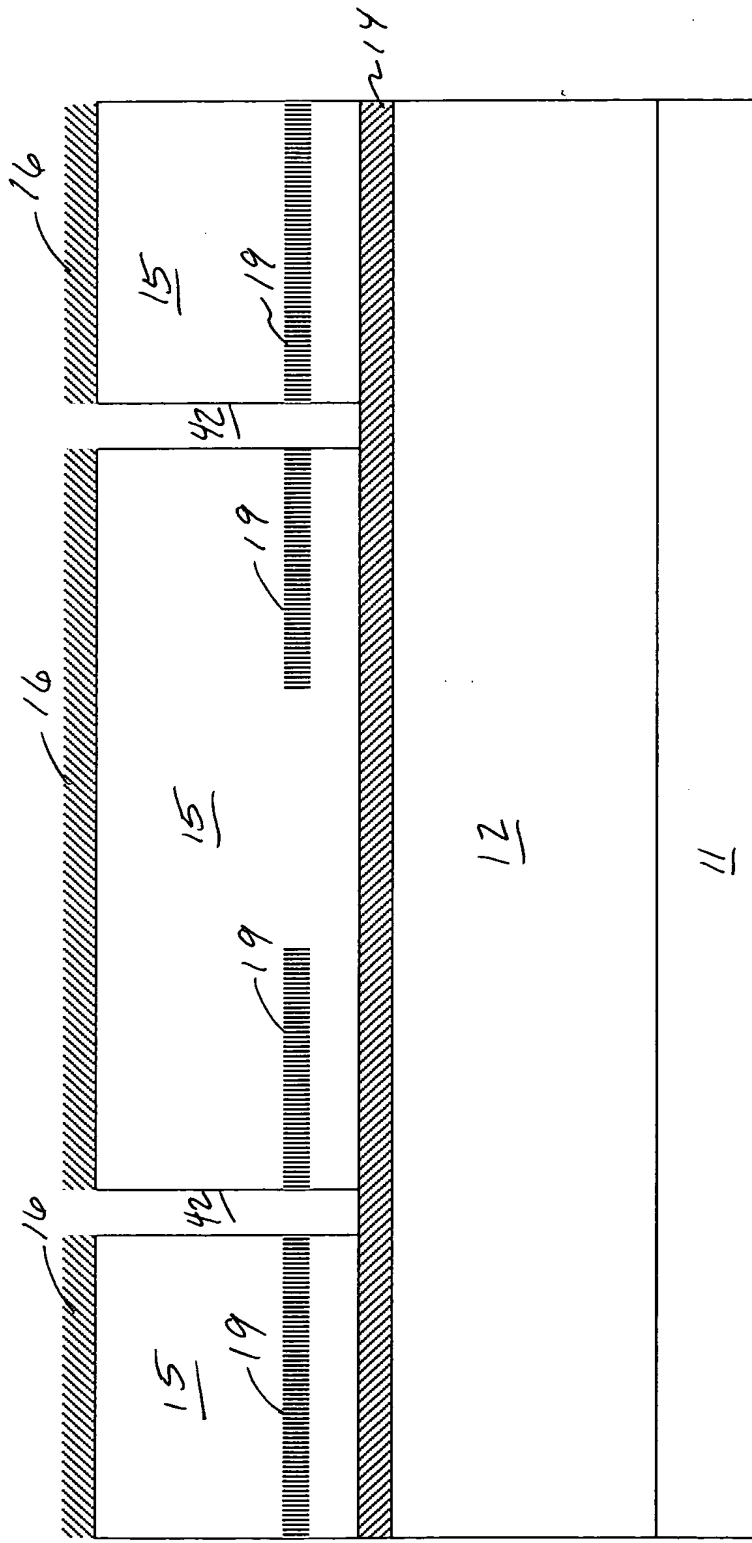


FIGURE 39

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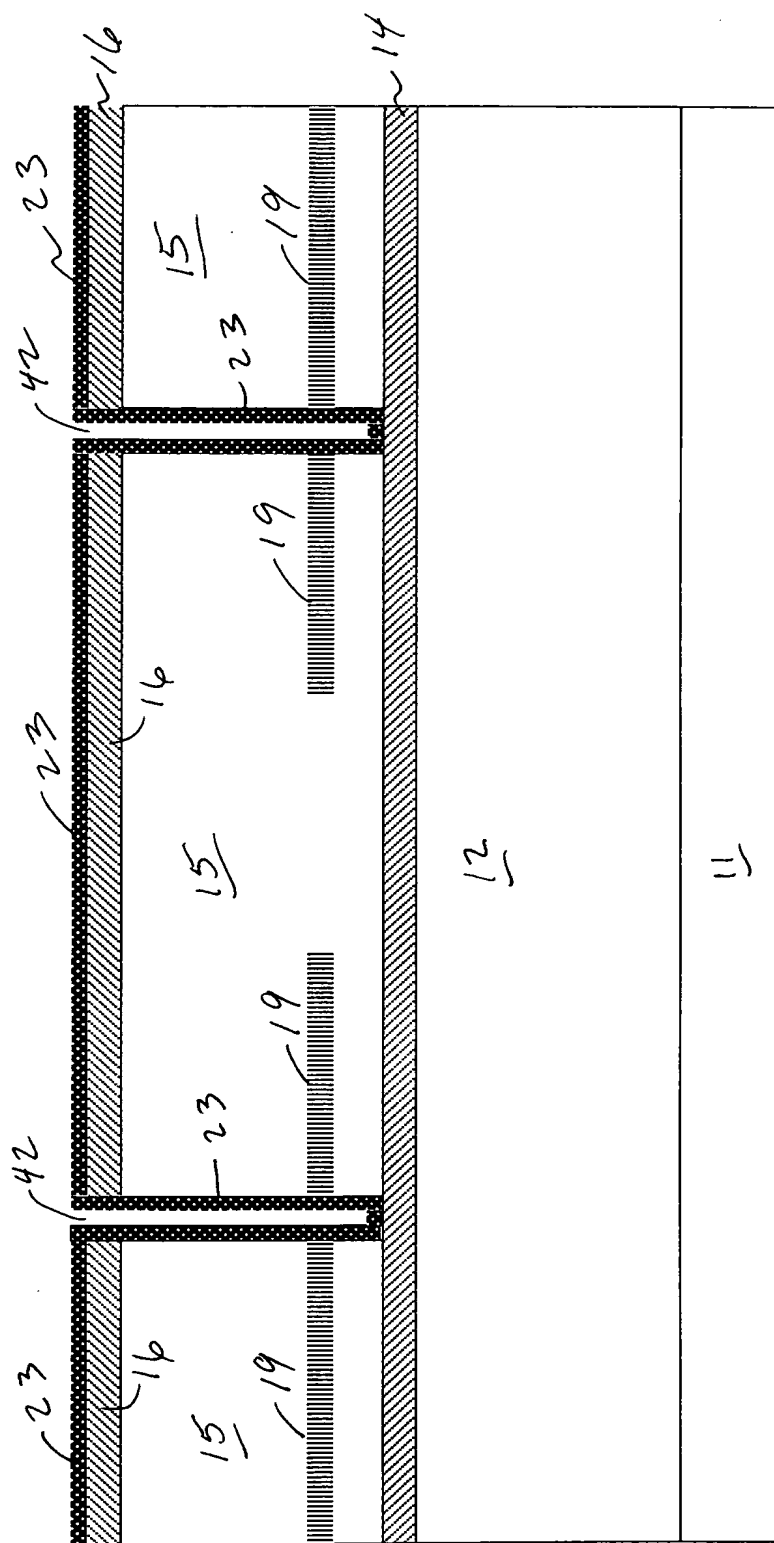


FIGURE 40

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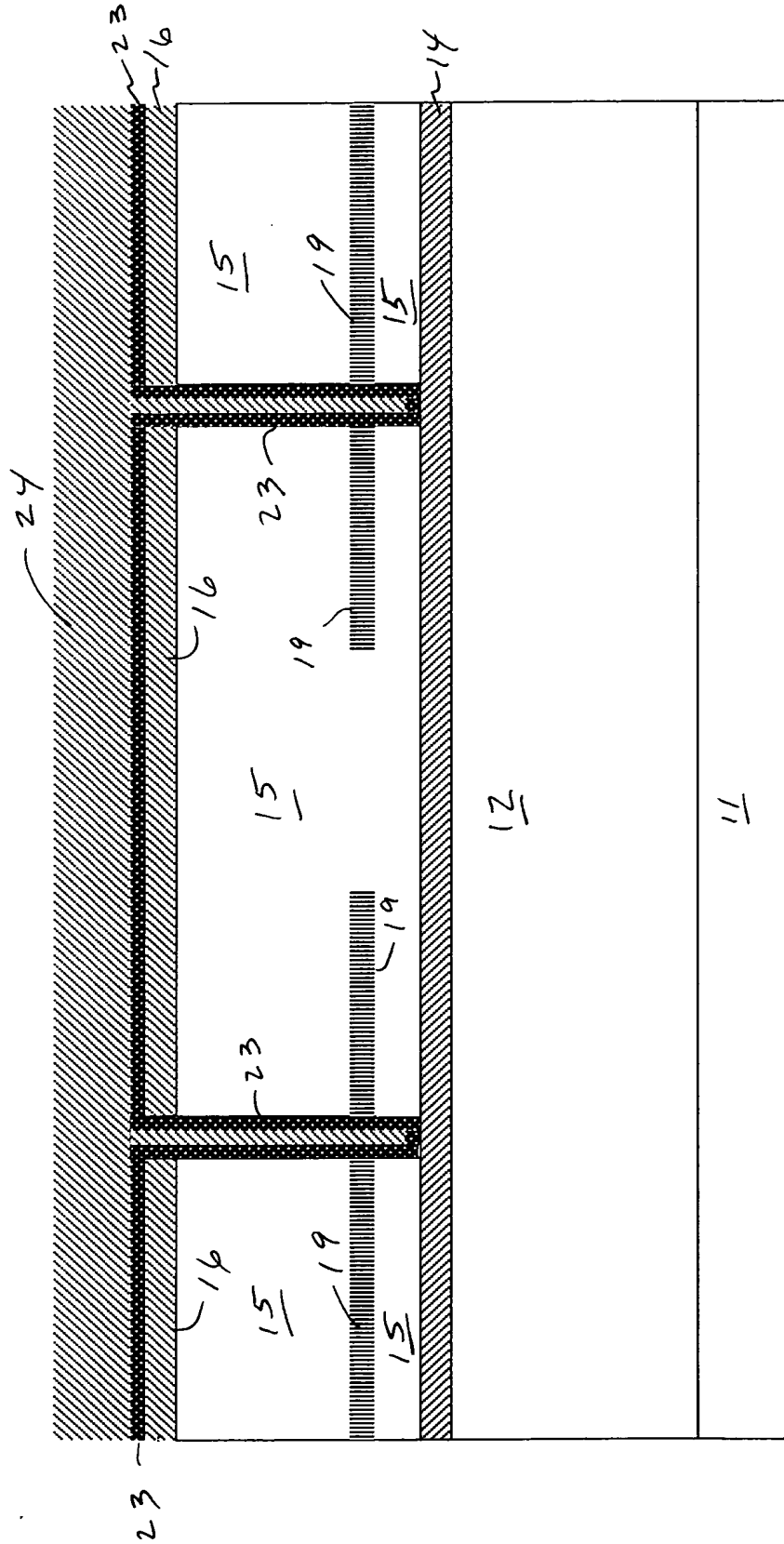


FIGURE 41

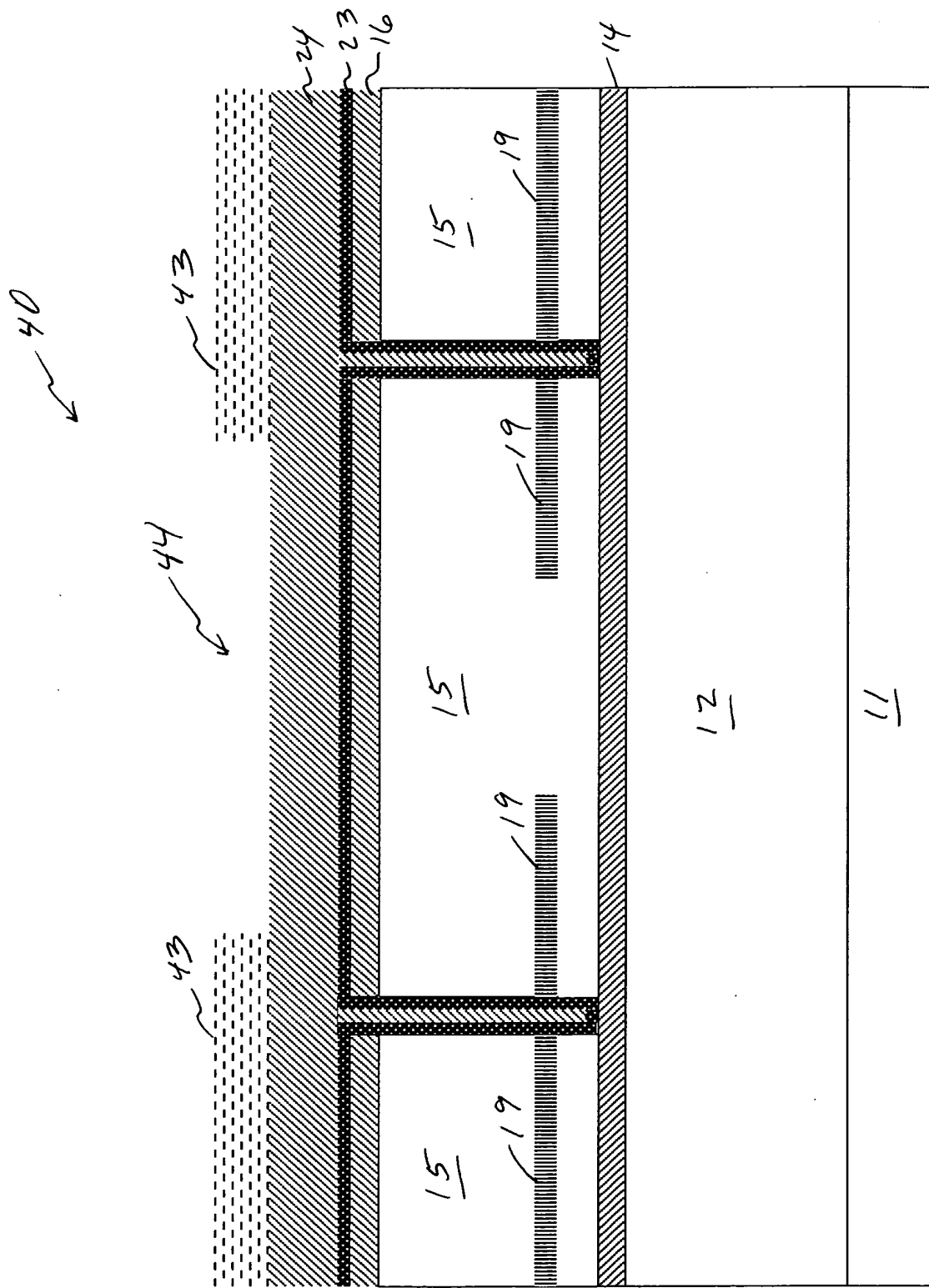


FIGURE 42

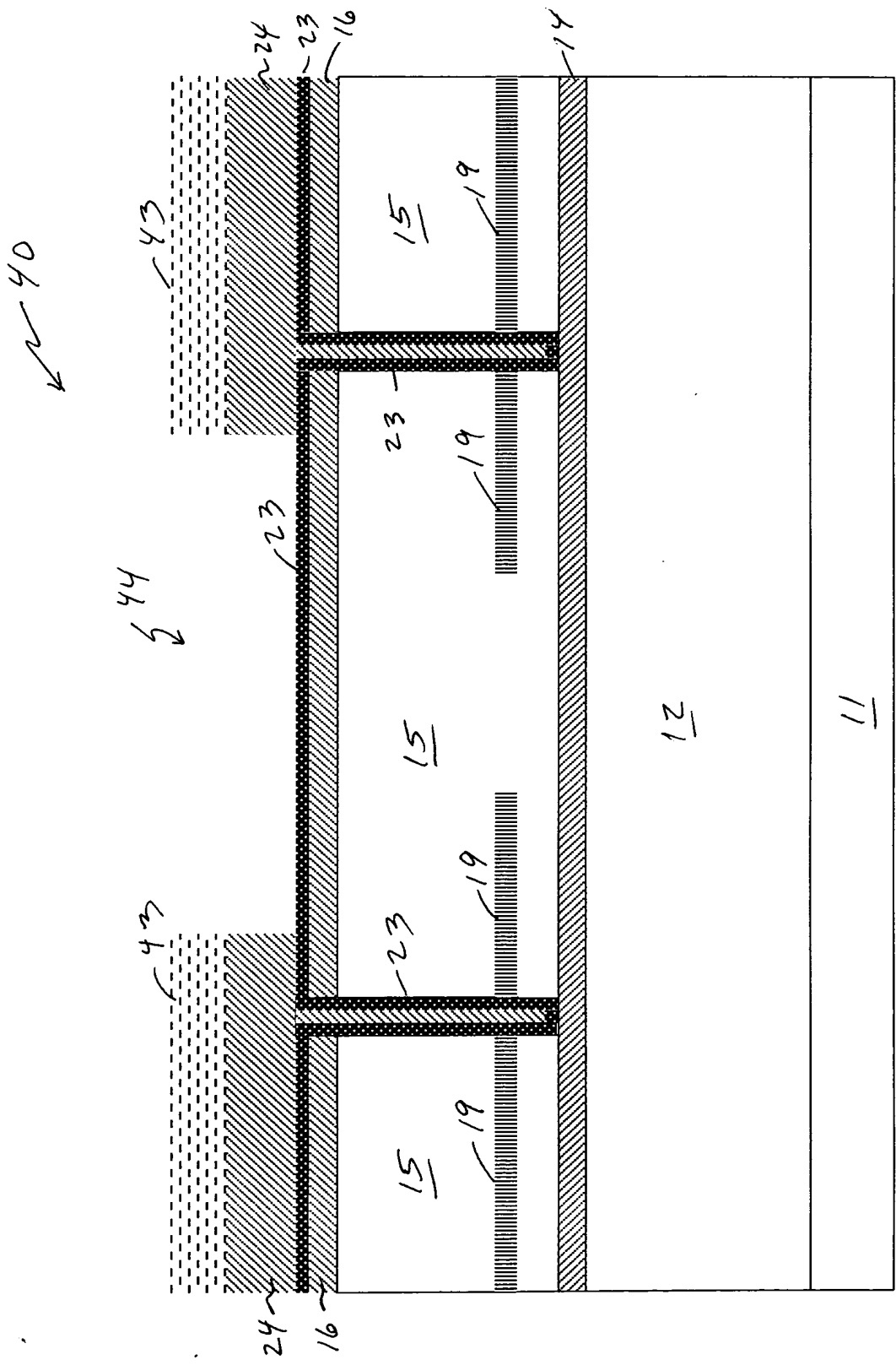


FIGURE 43

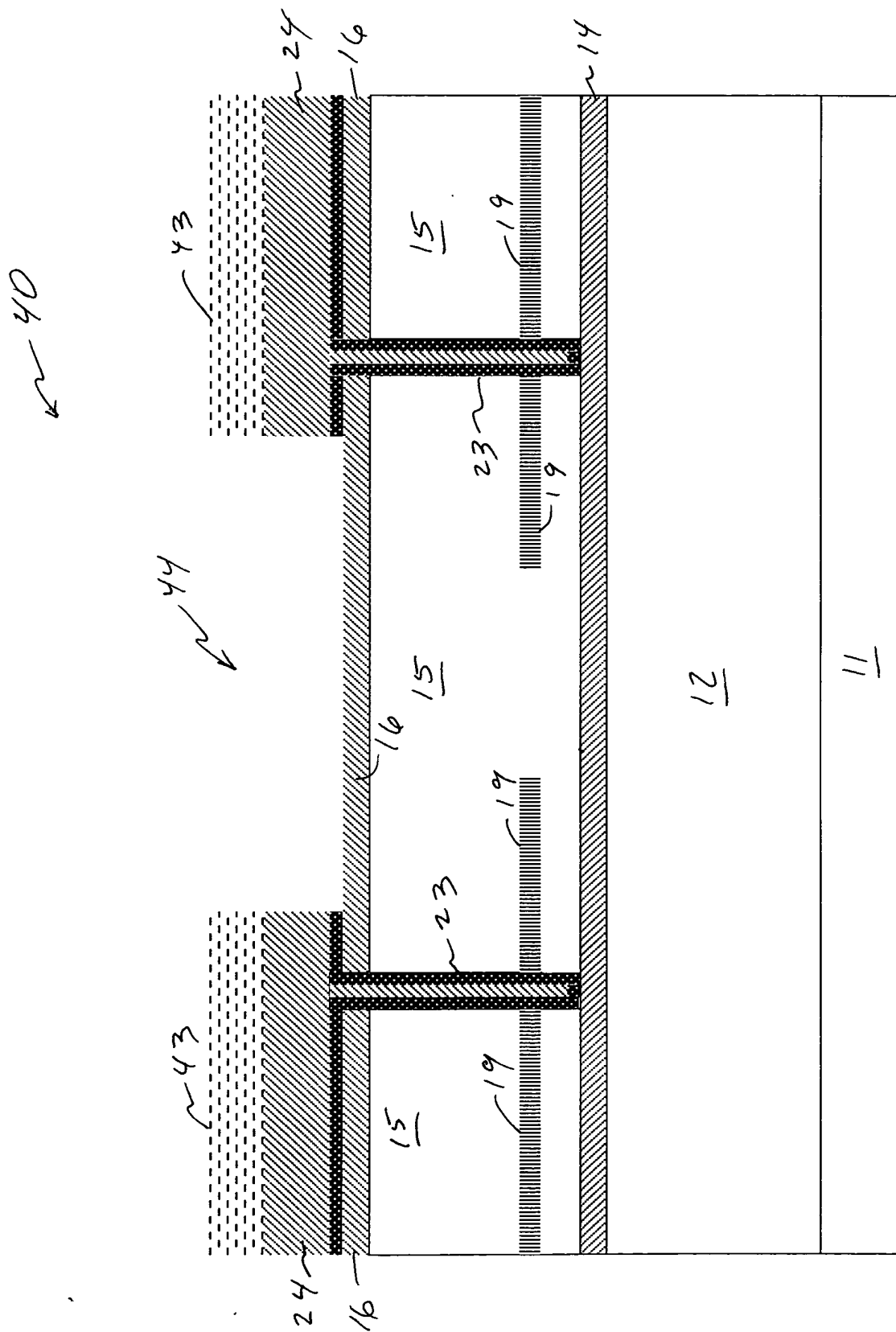


FIGURE 44

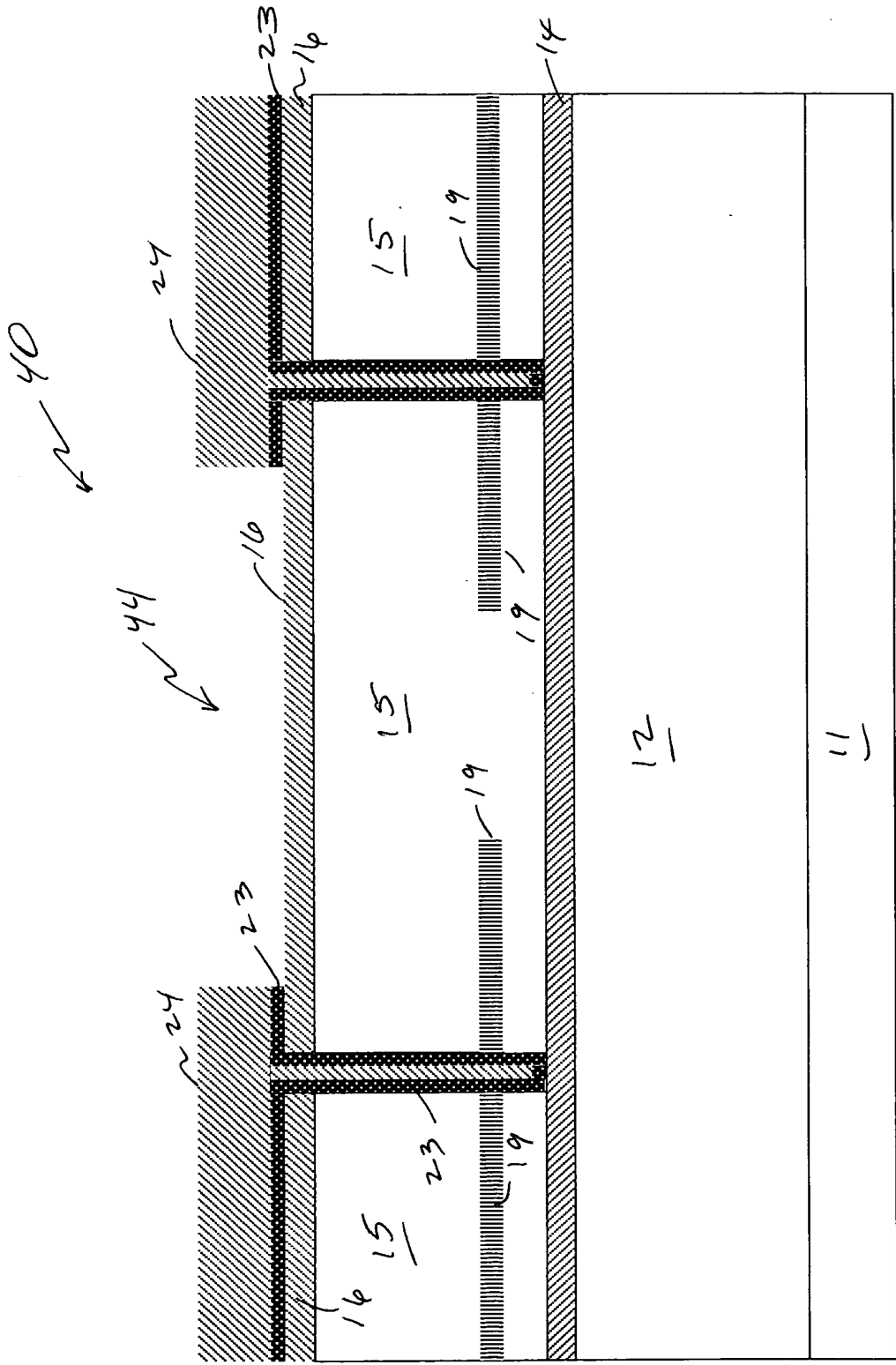


FIGURE 45

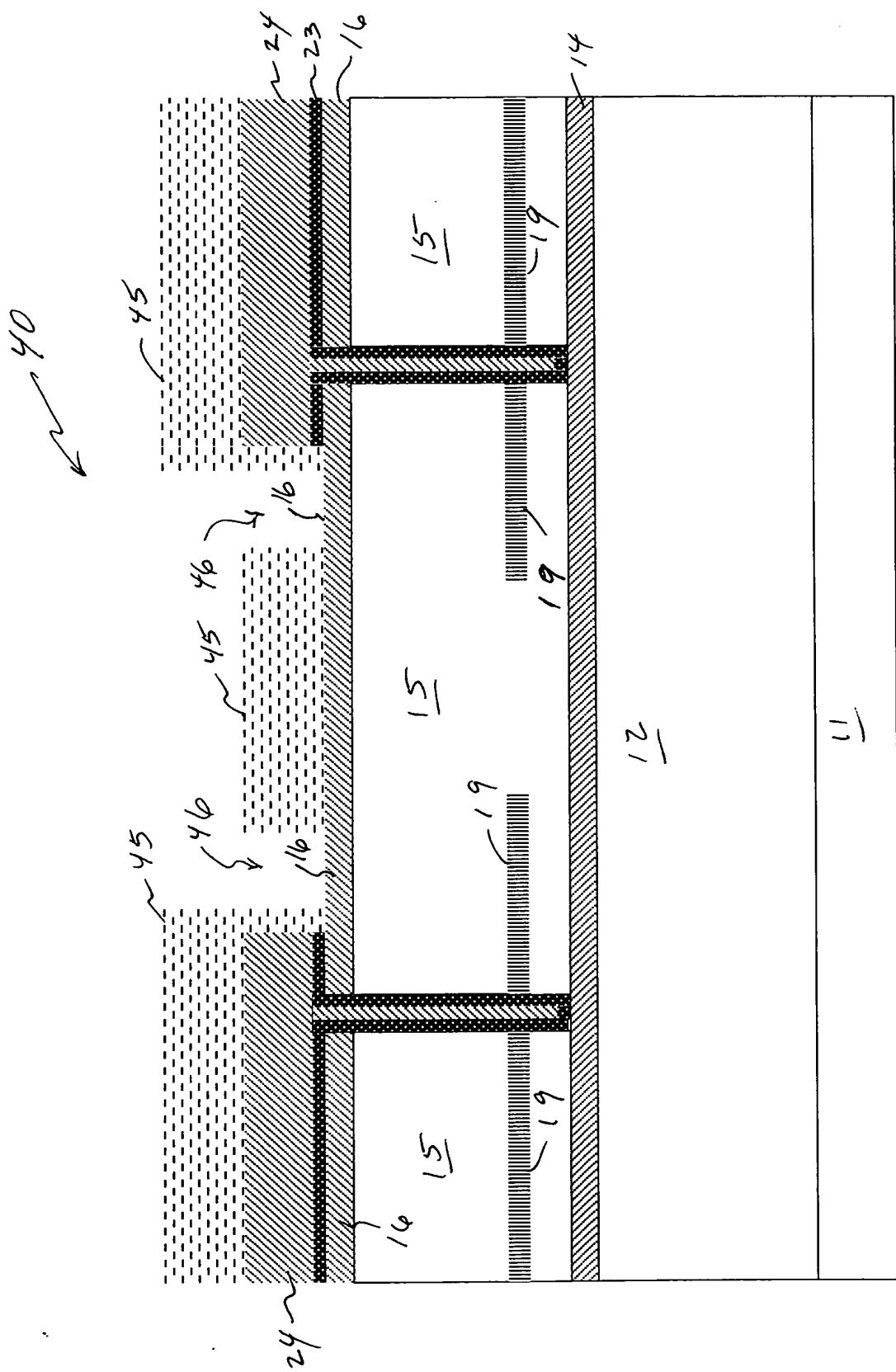


FIGURE 46

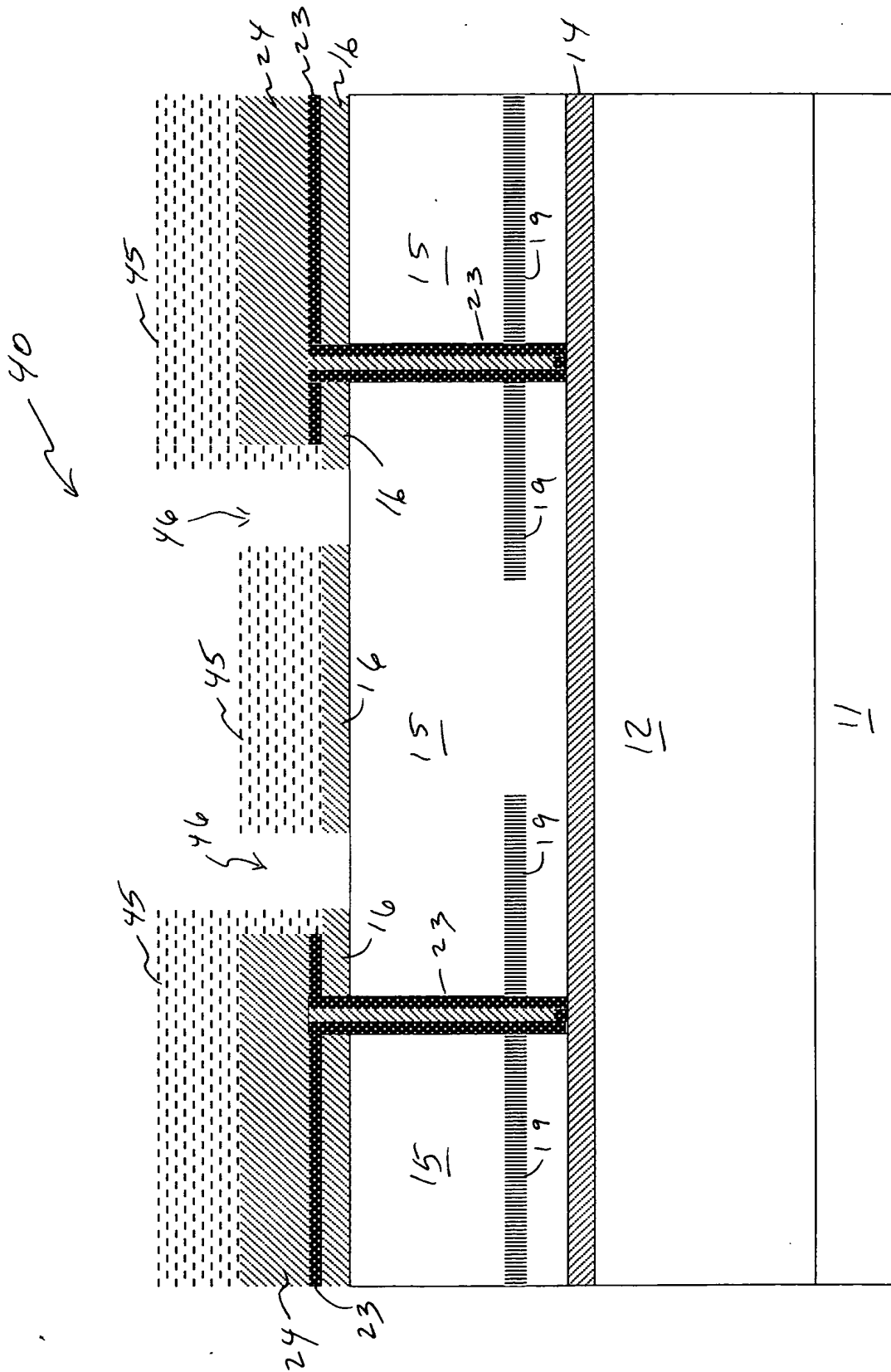


FIGURE 47

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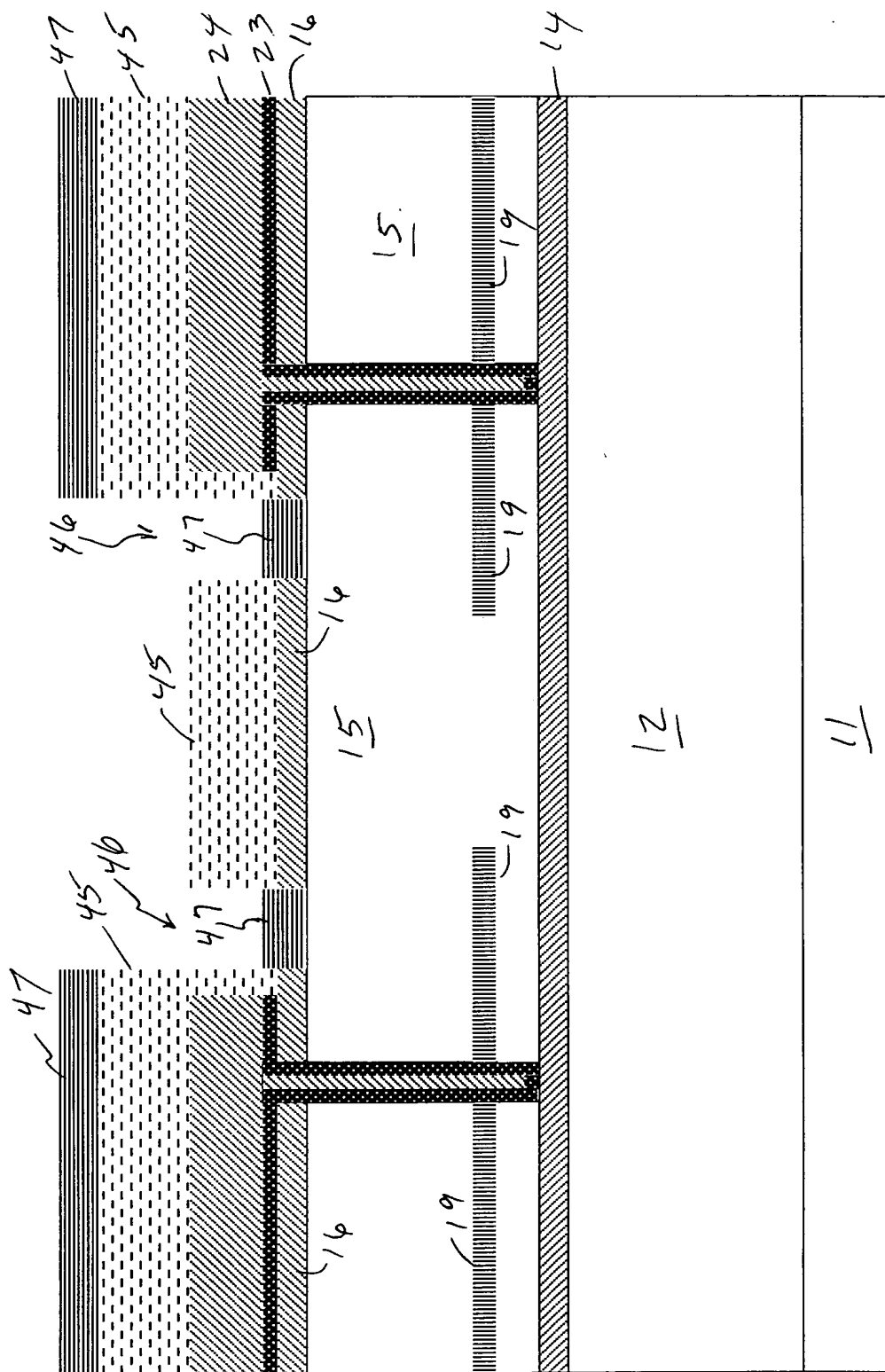
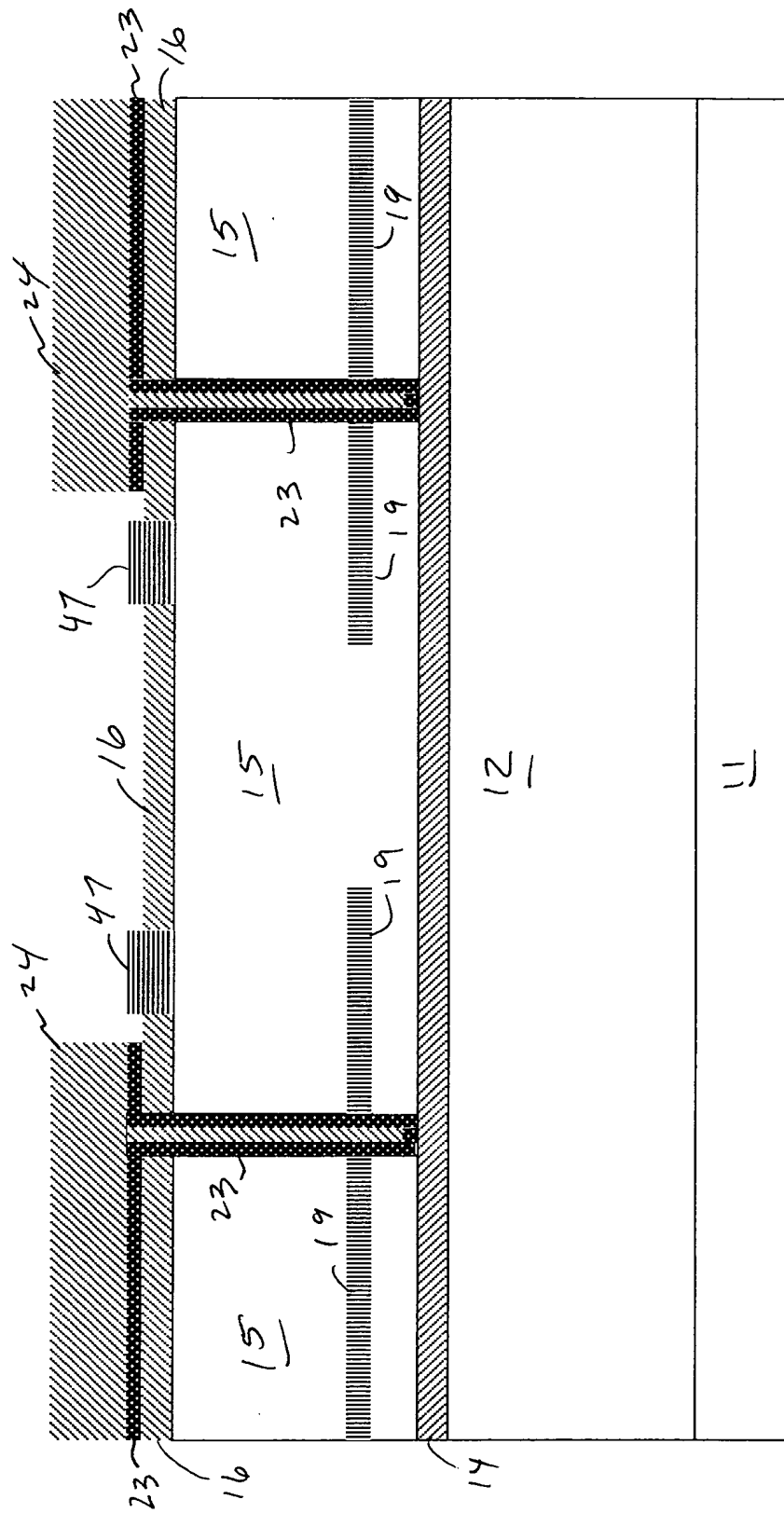


FIGURE 48

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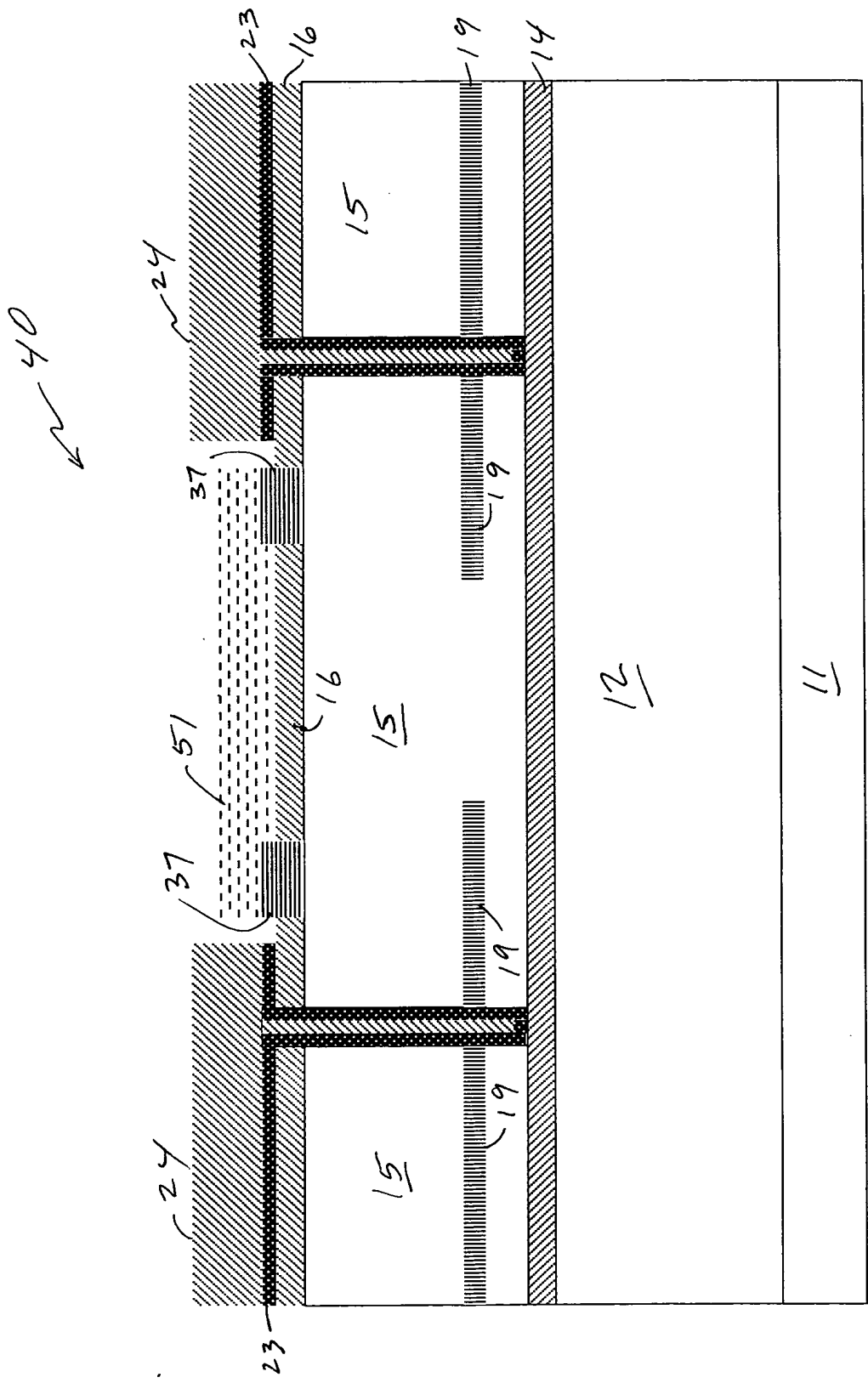


FIGURE 50

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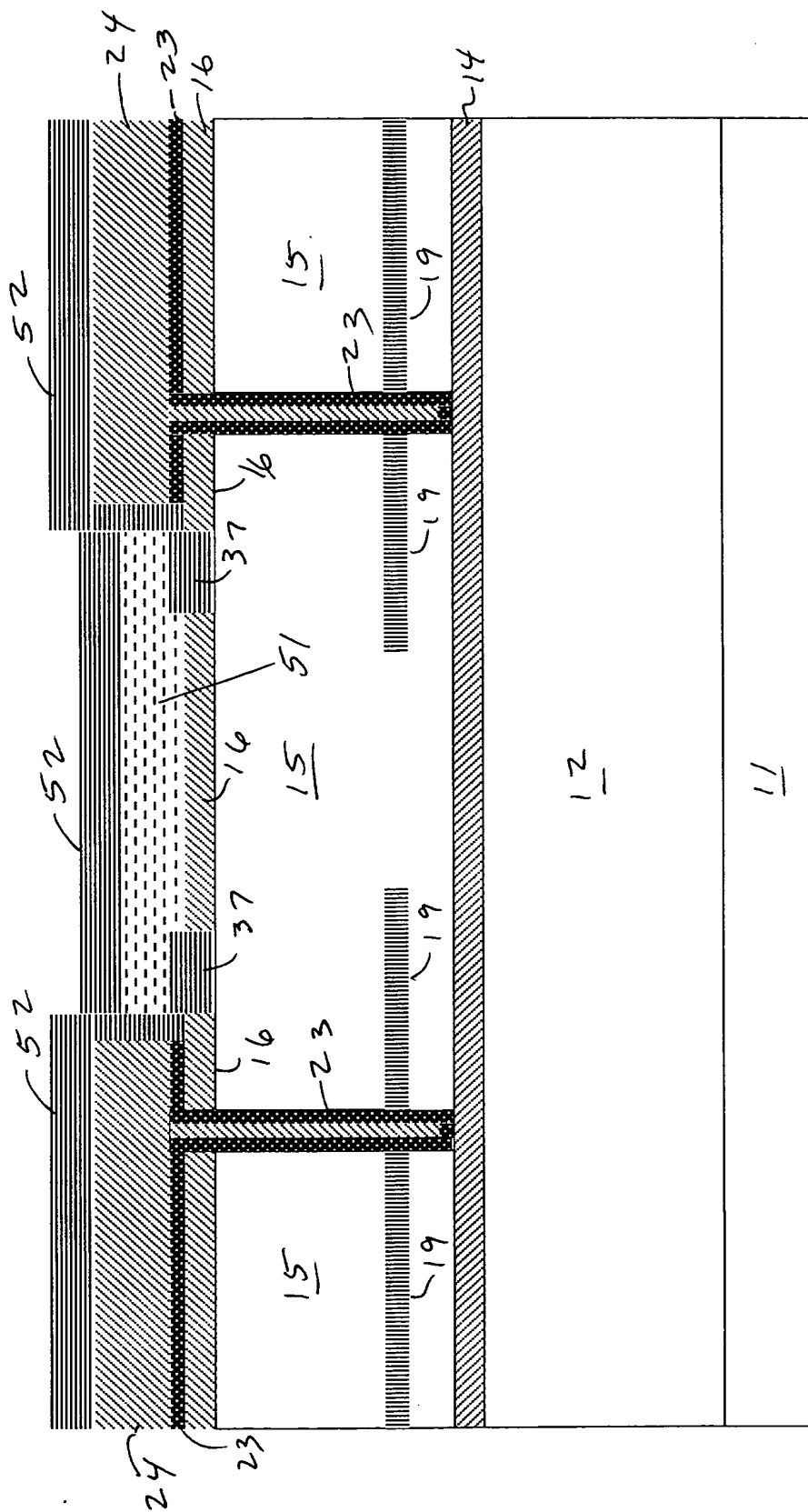


FIGURE 51

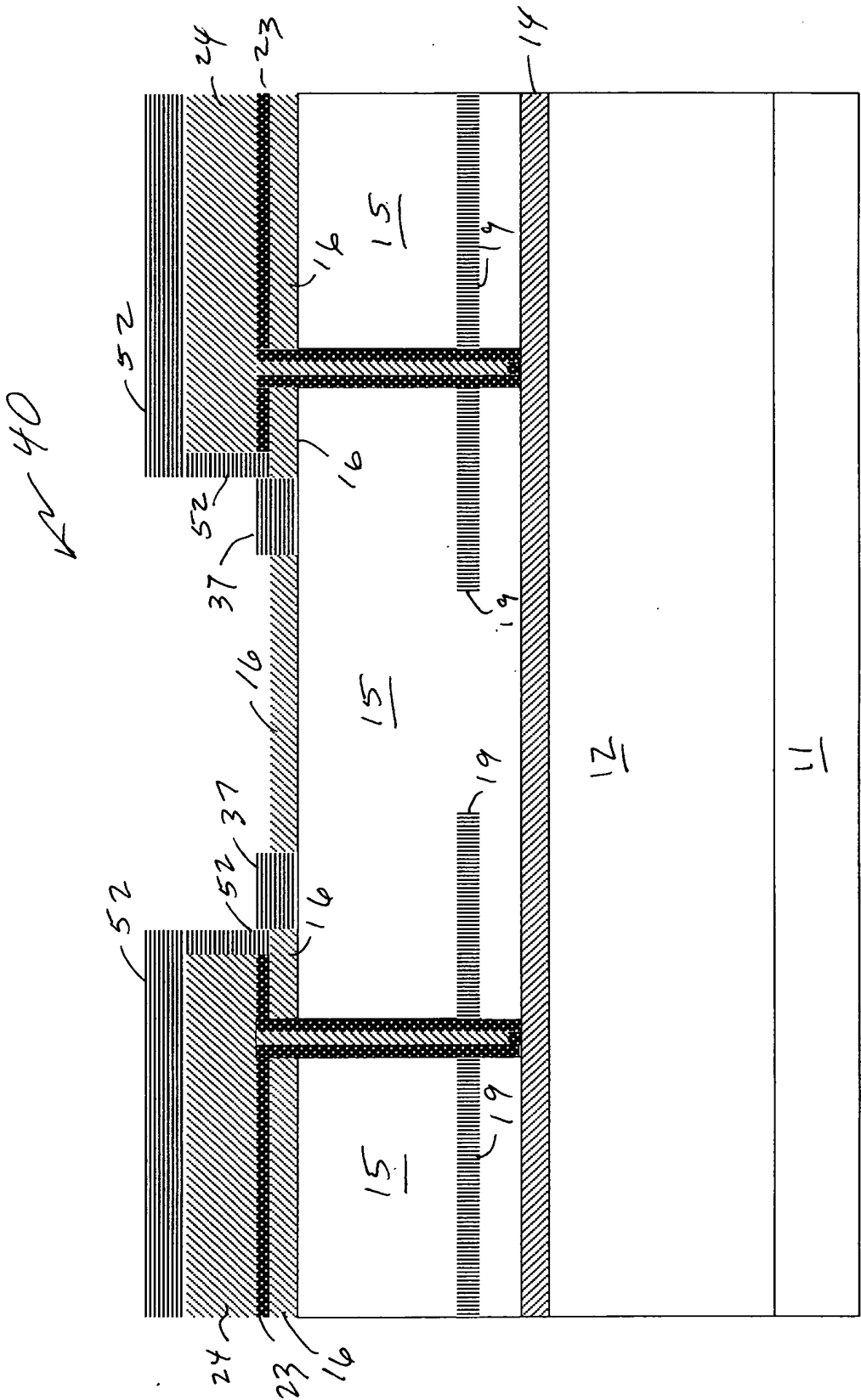


FIGURE 52

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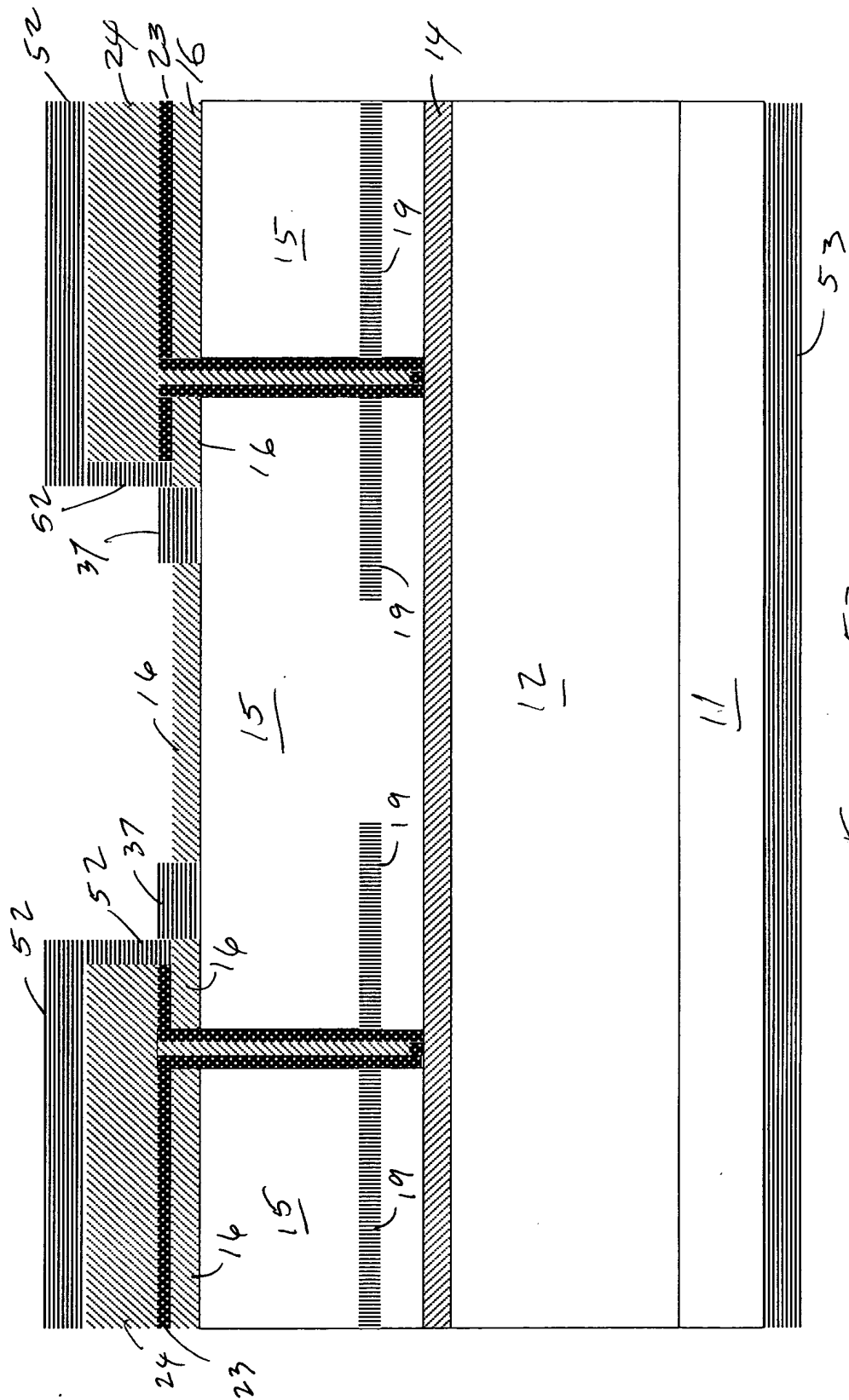


FIGURE 53

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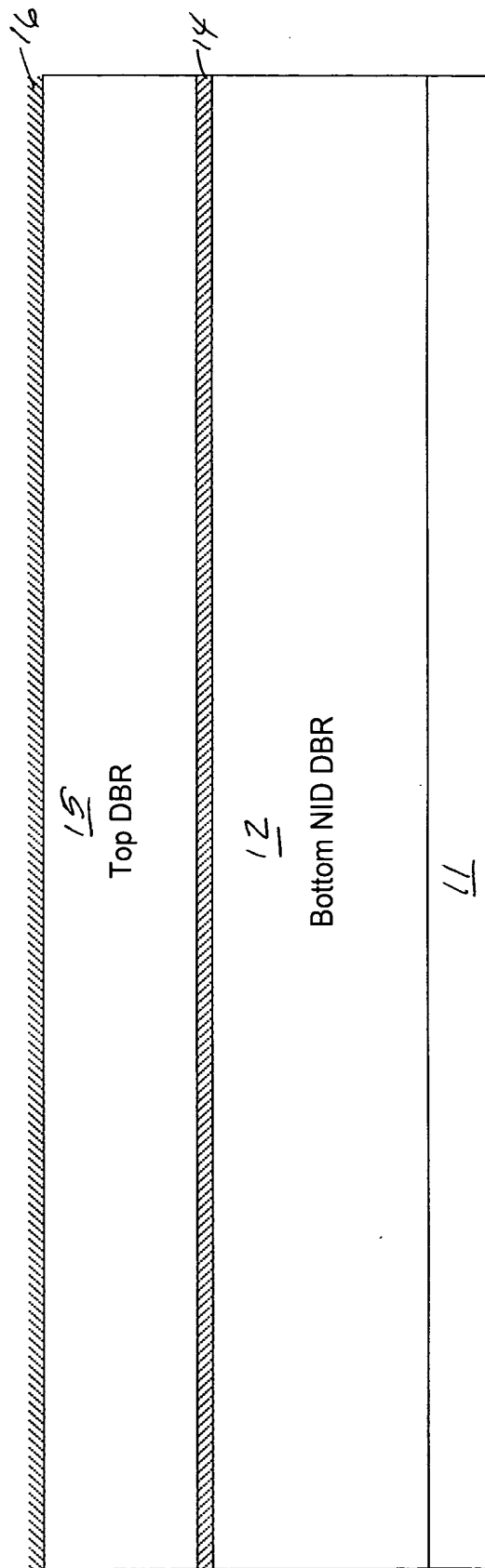
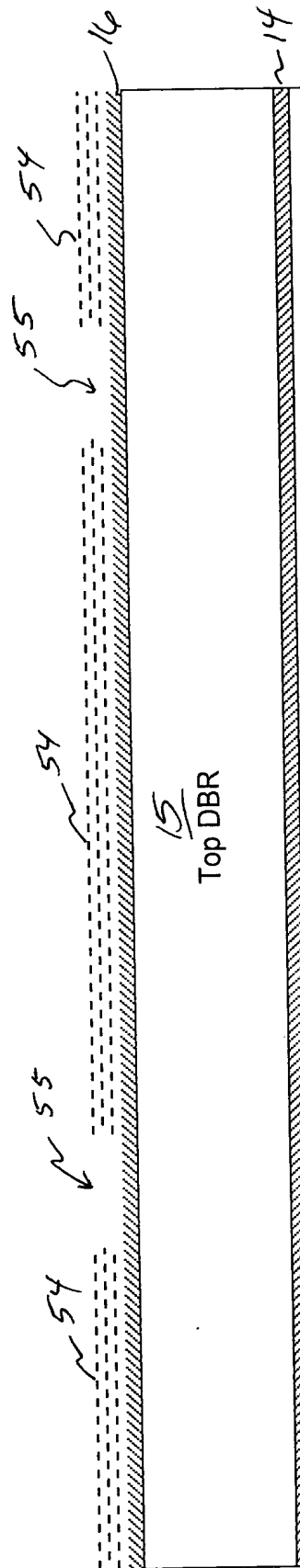


FIGURE 54

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FIGURE 55

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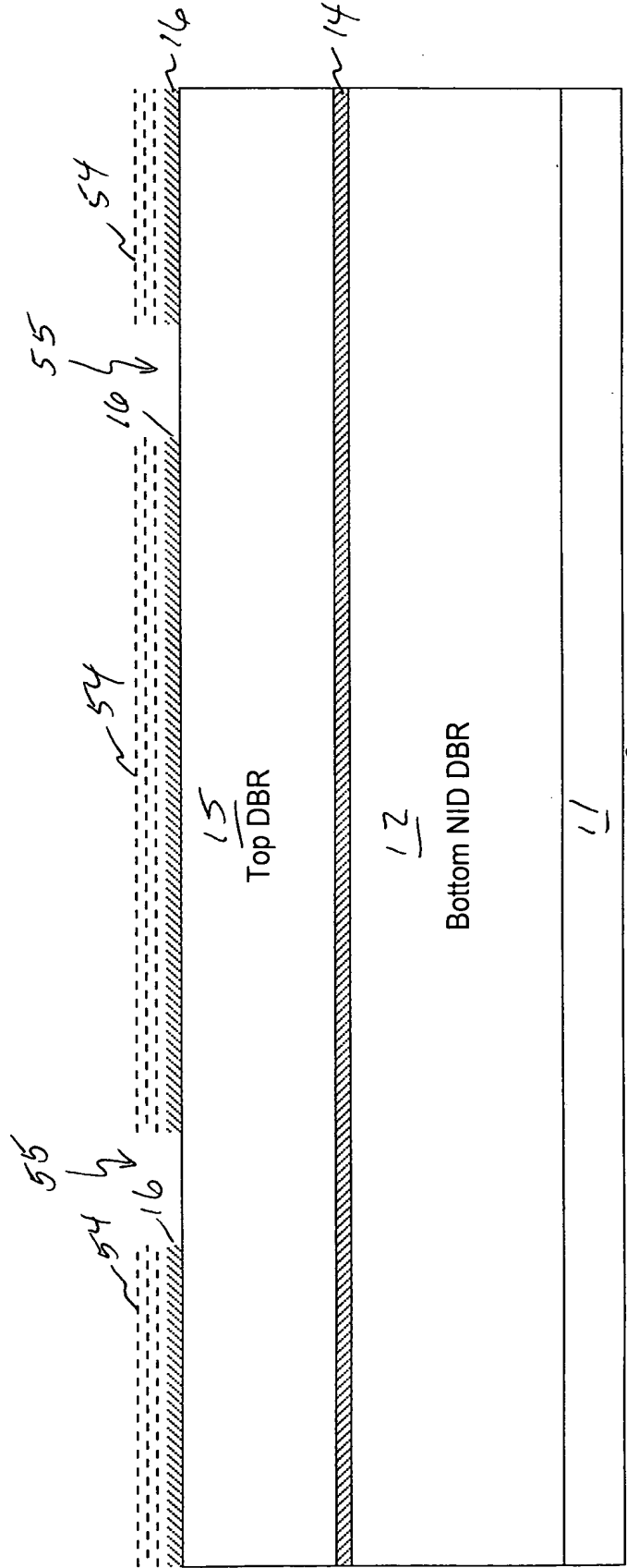


FIGURE 5b

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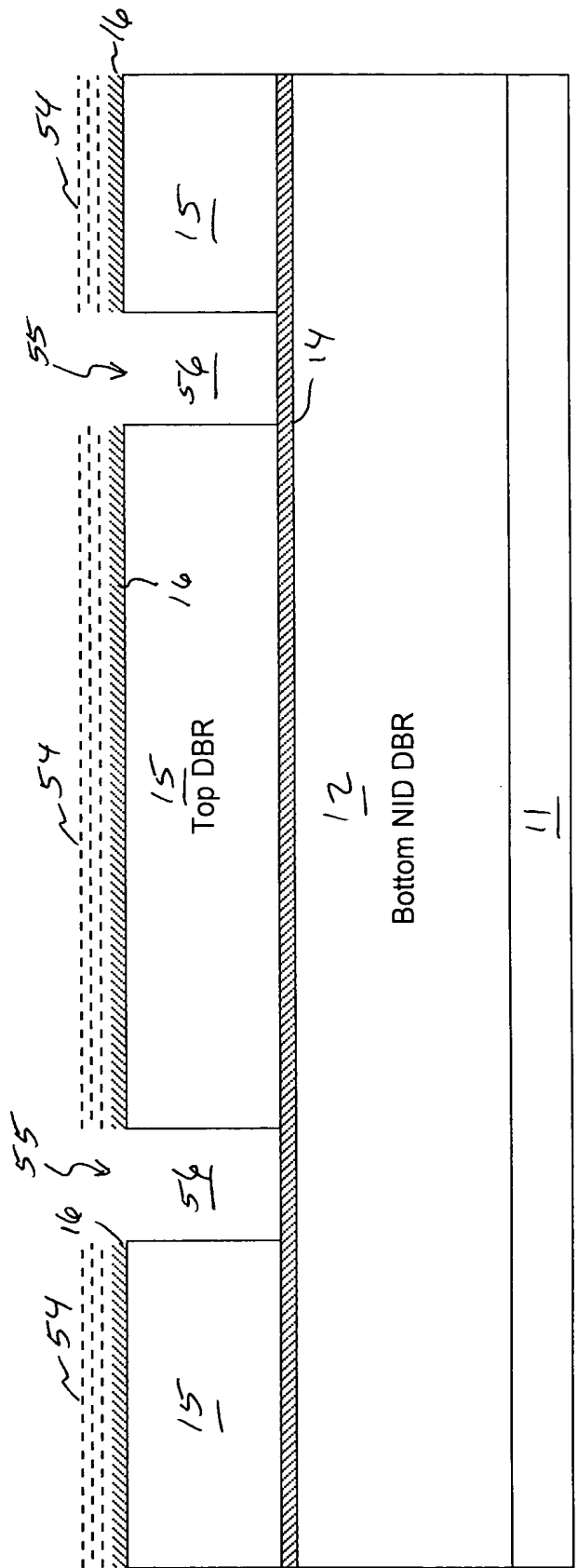


FIGURE 57

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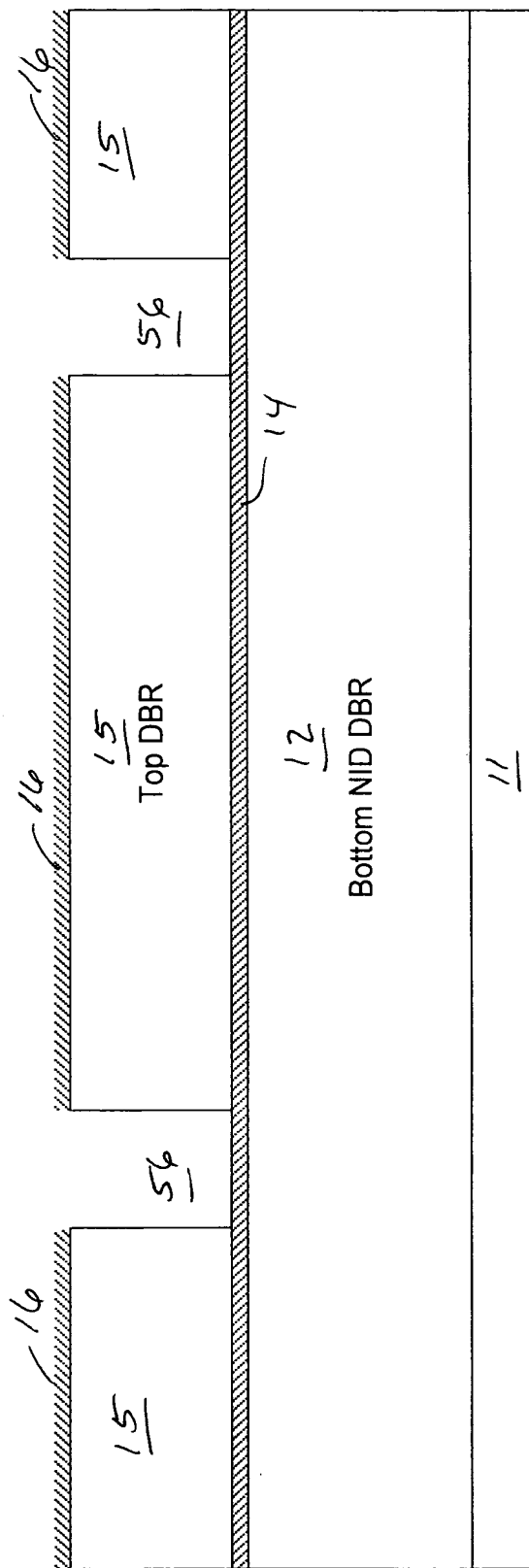


FIGURE 5B

50 ↗

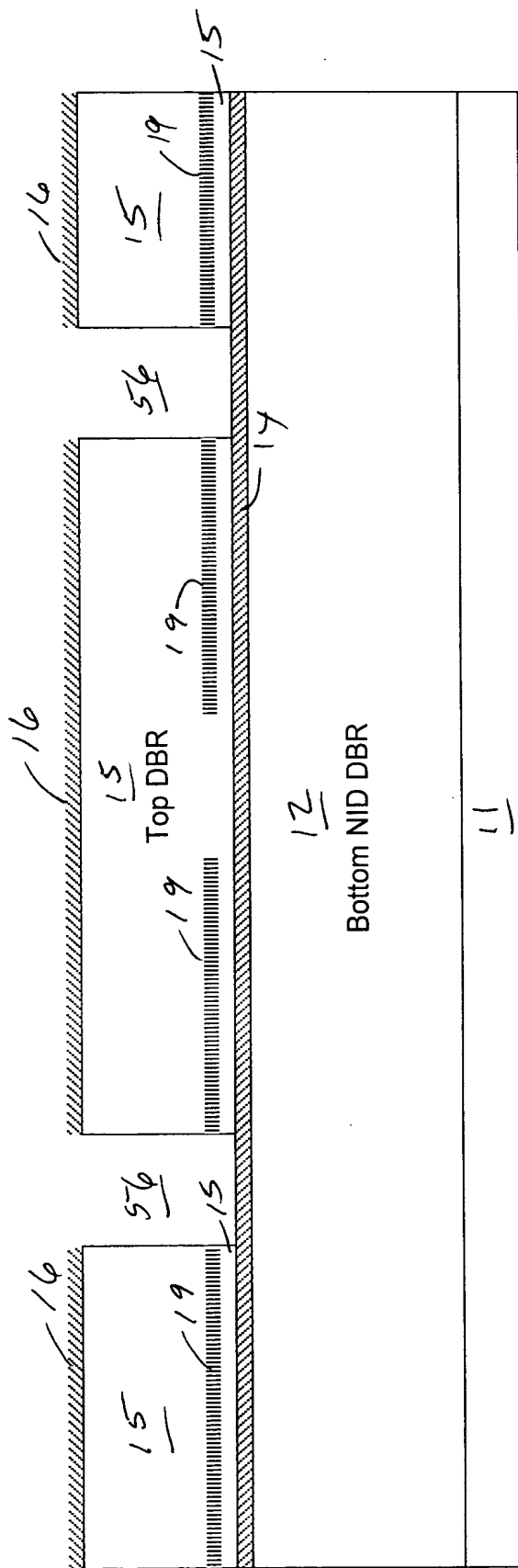


FIGURE 59

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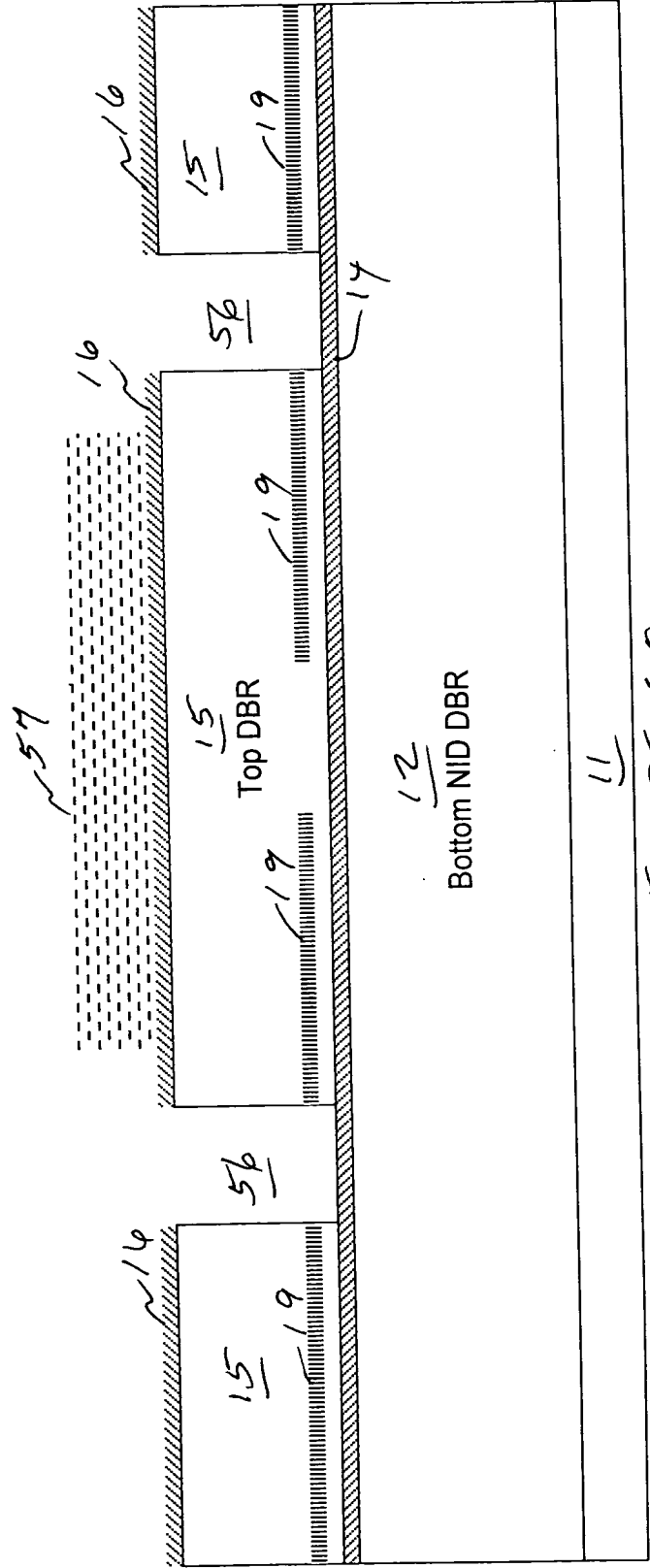


FIGURE 60

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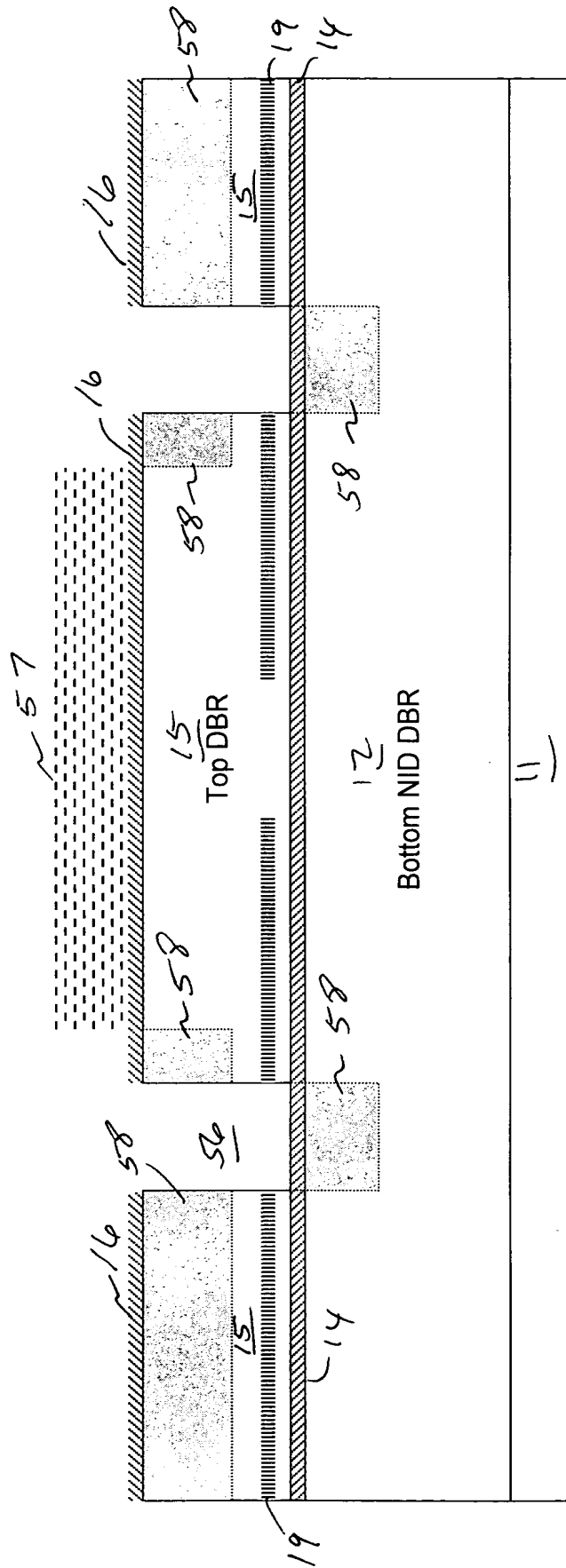


FIGURE 61

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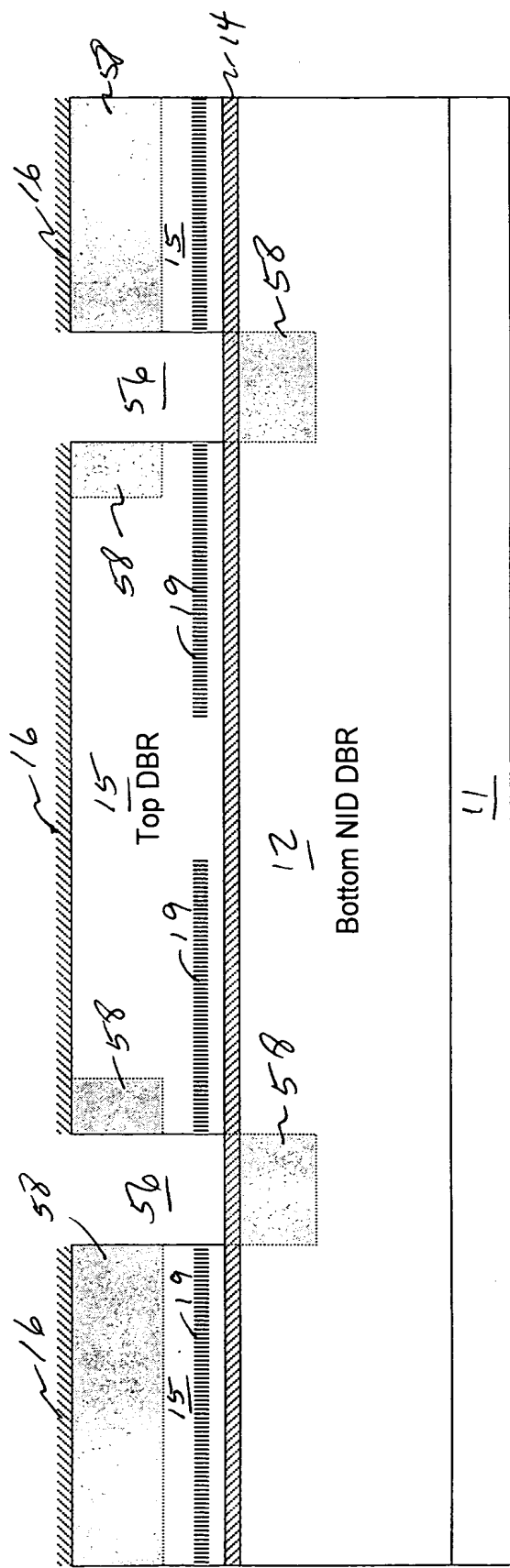
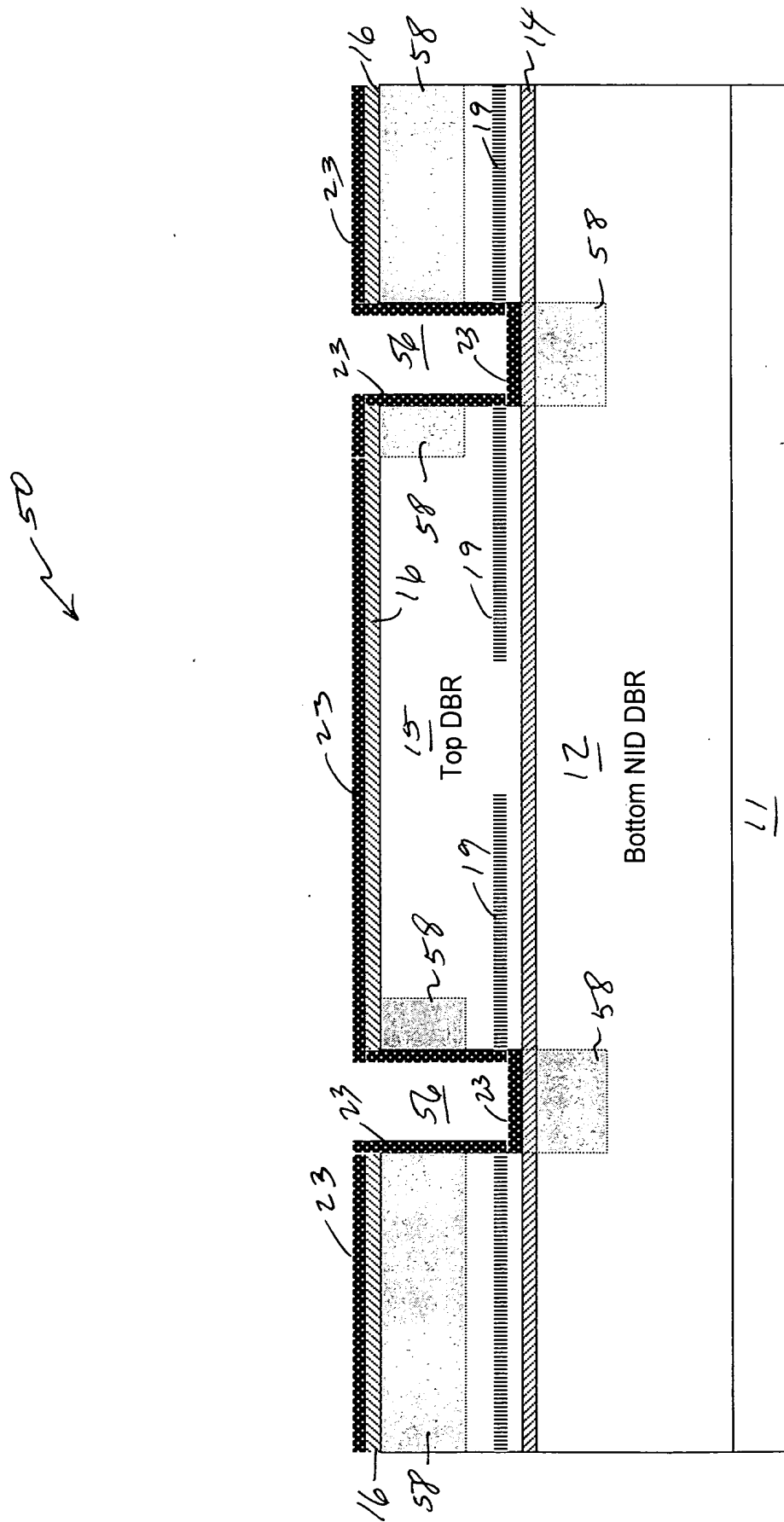


FIGURE 62



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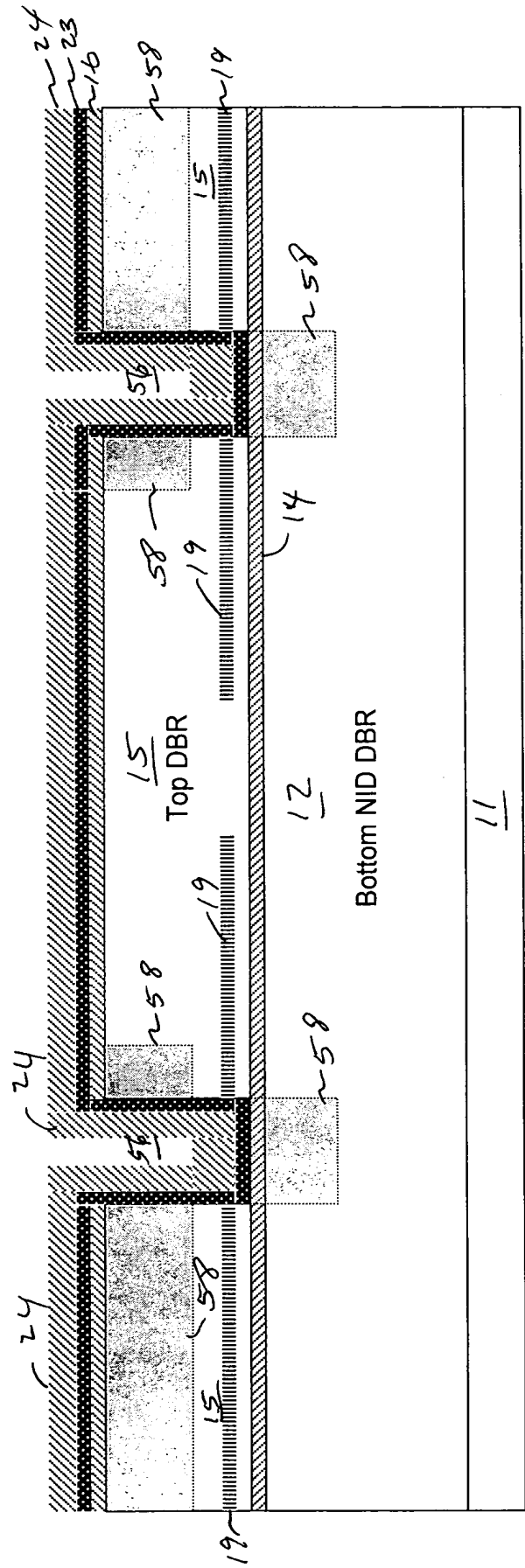


FIGURE 64

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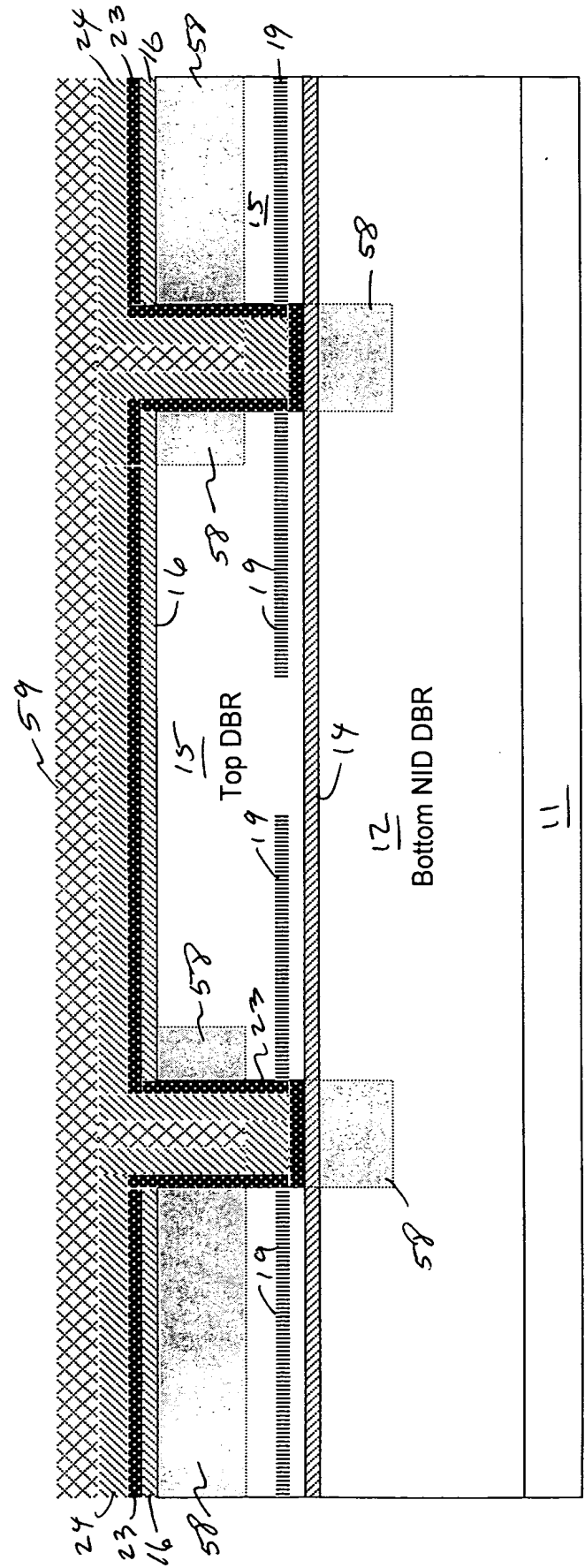


FIGURE 65

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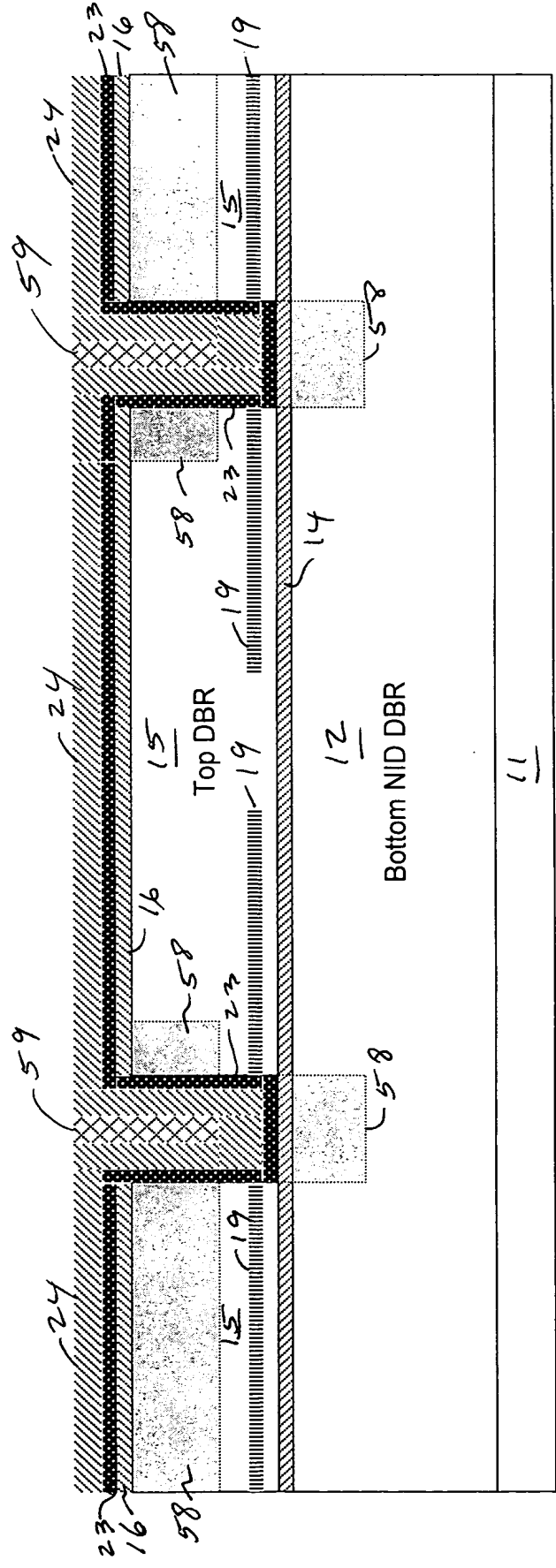


FIGURE 64

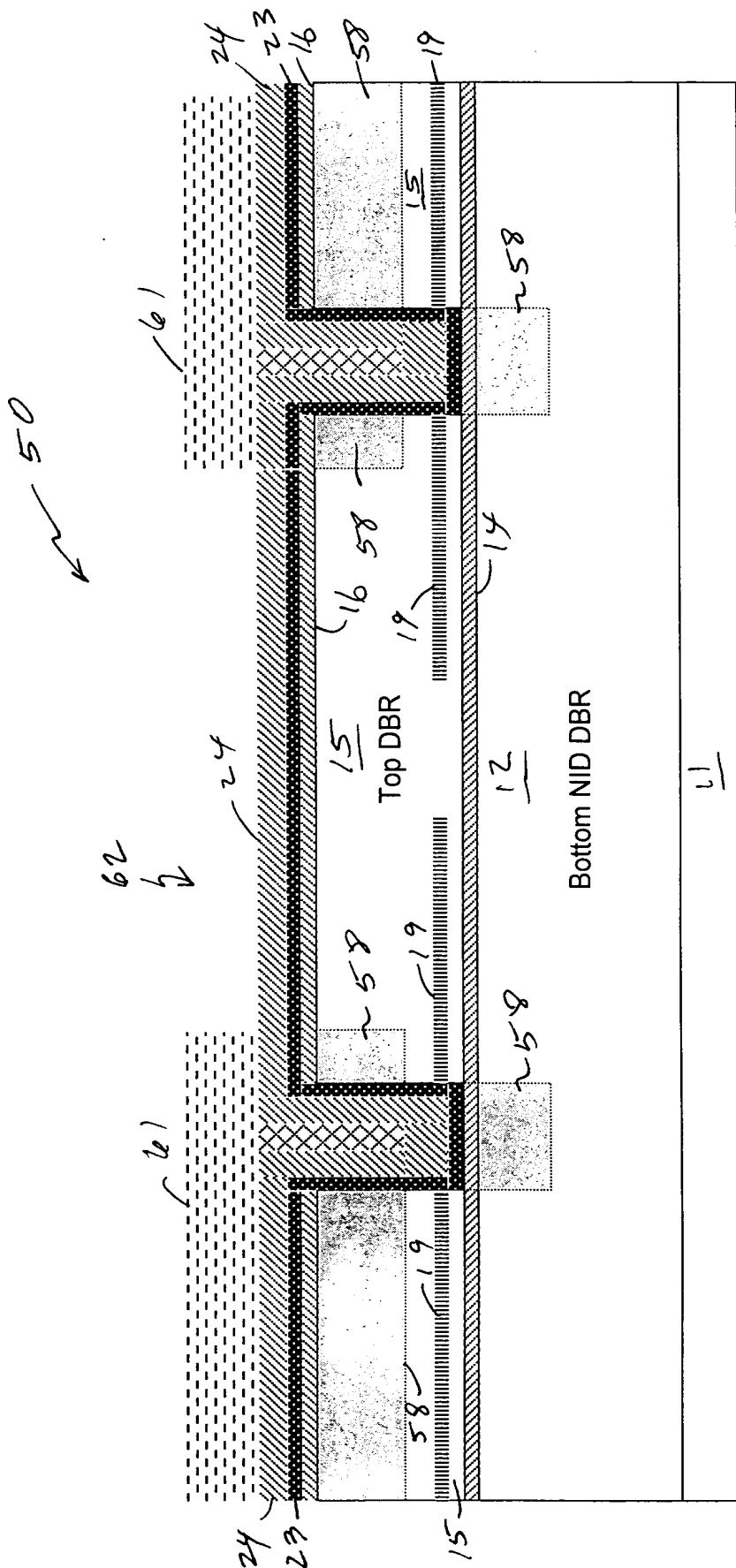


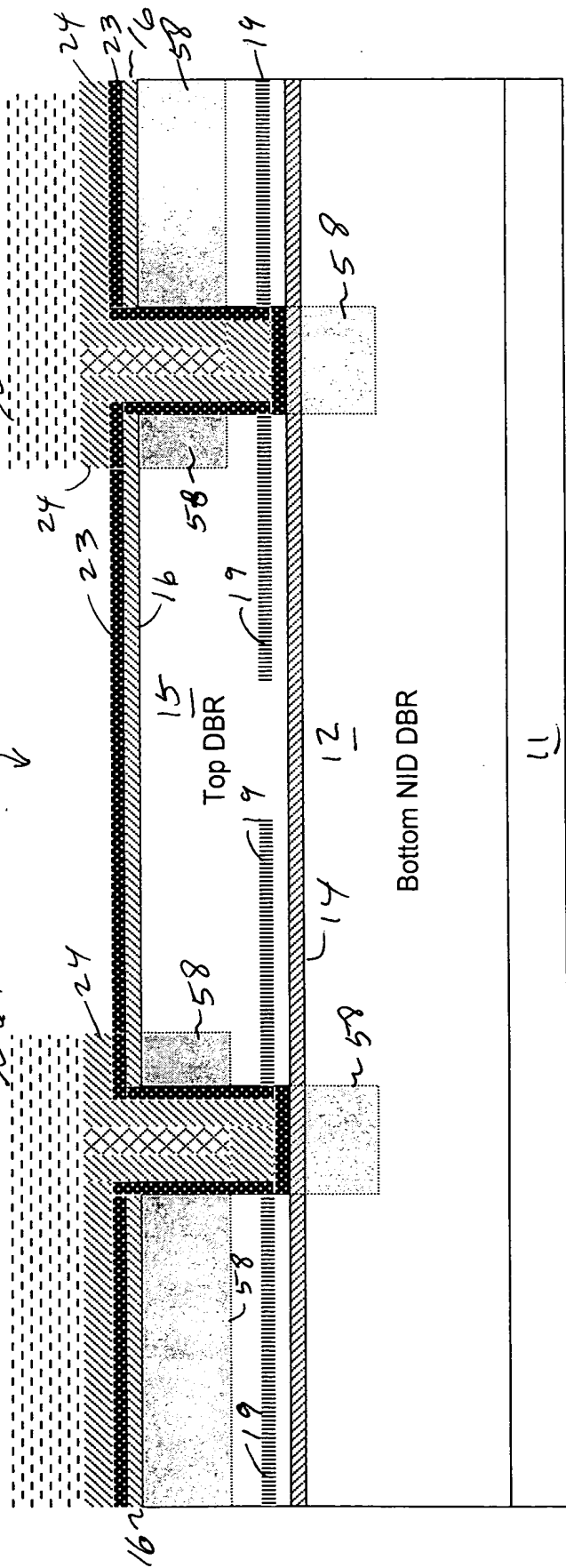
FIGURE 67

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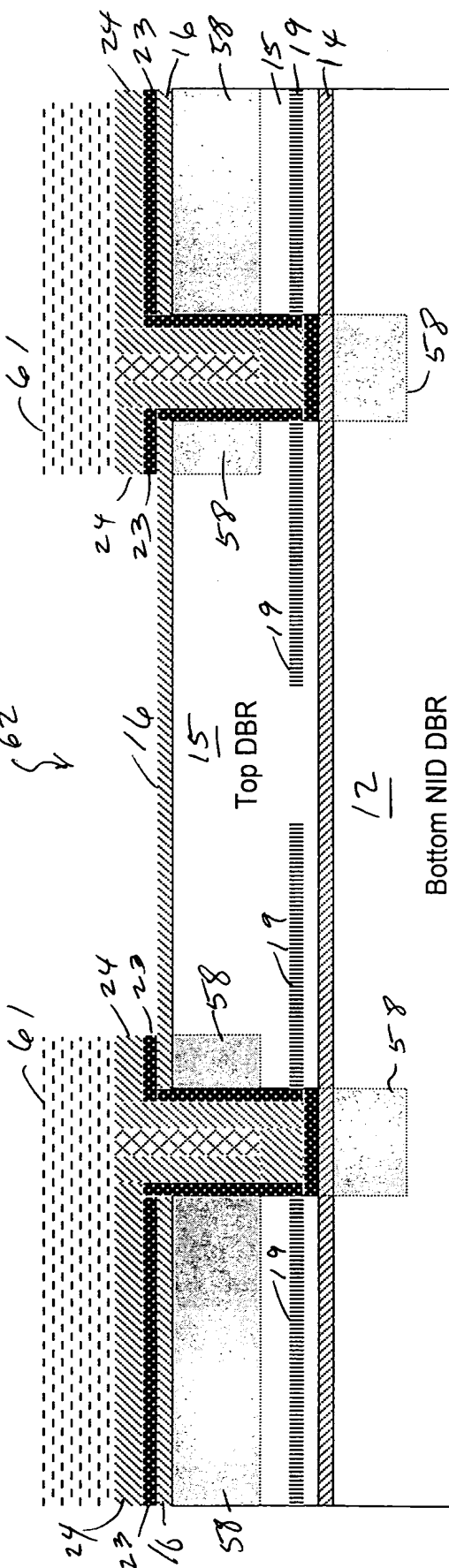


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FIGURE 68

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FIGURE 69

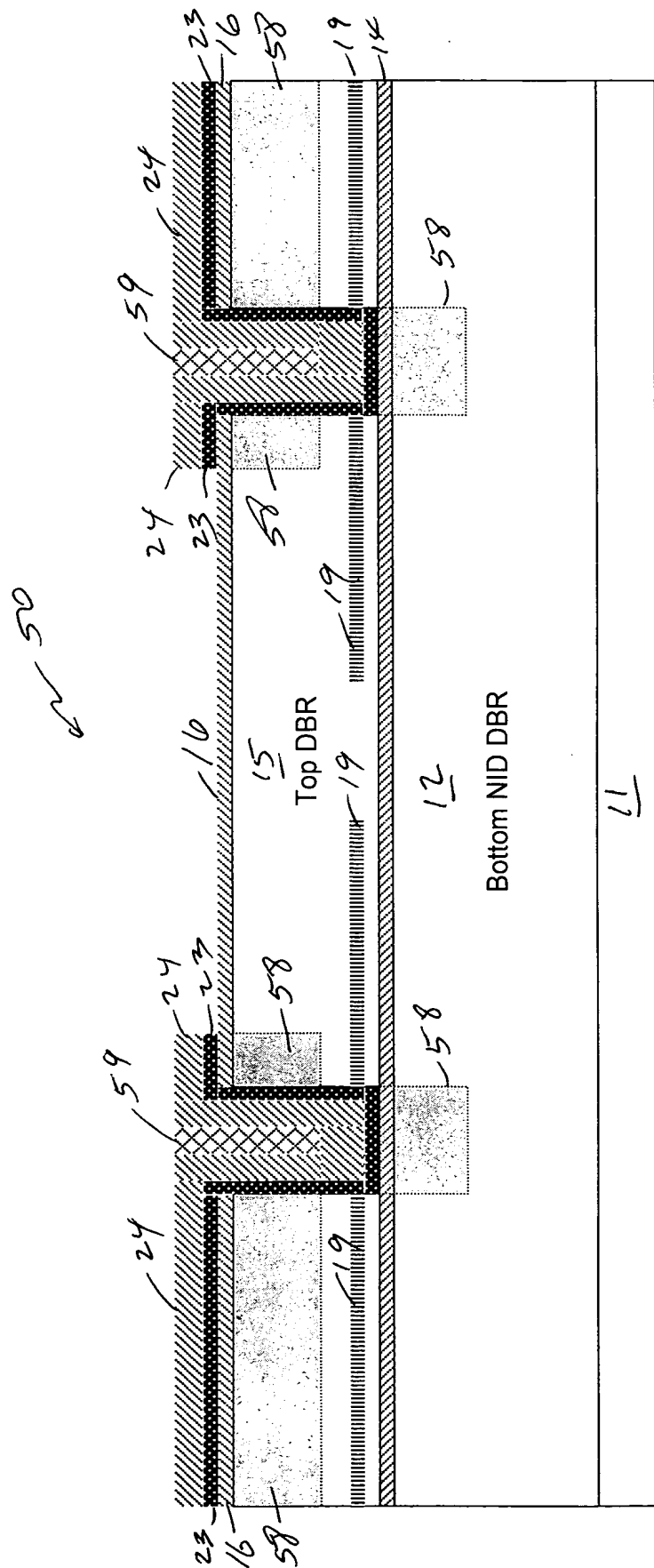


FIGURE 20

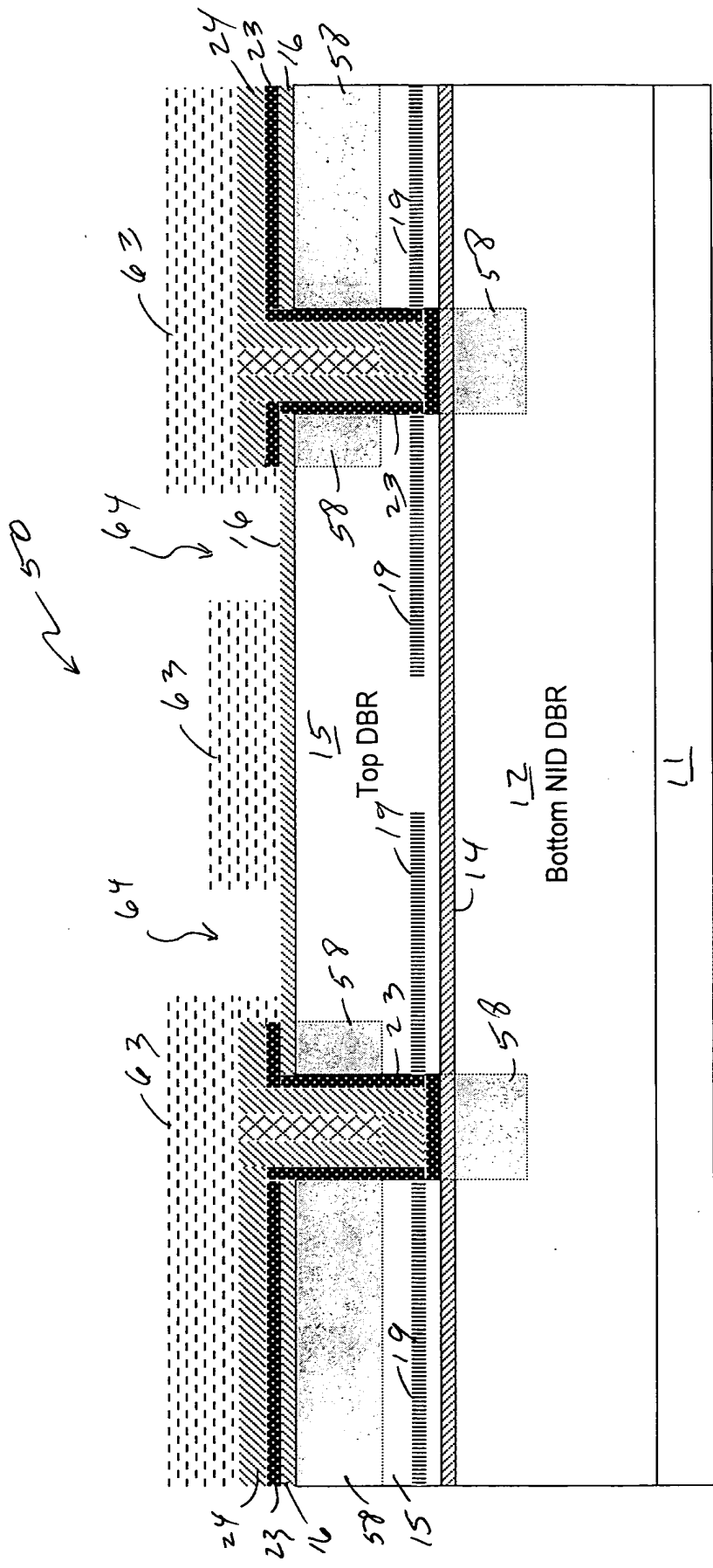


FIGURE 71

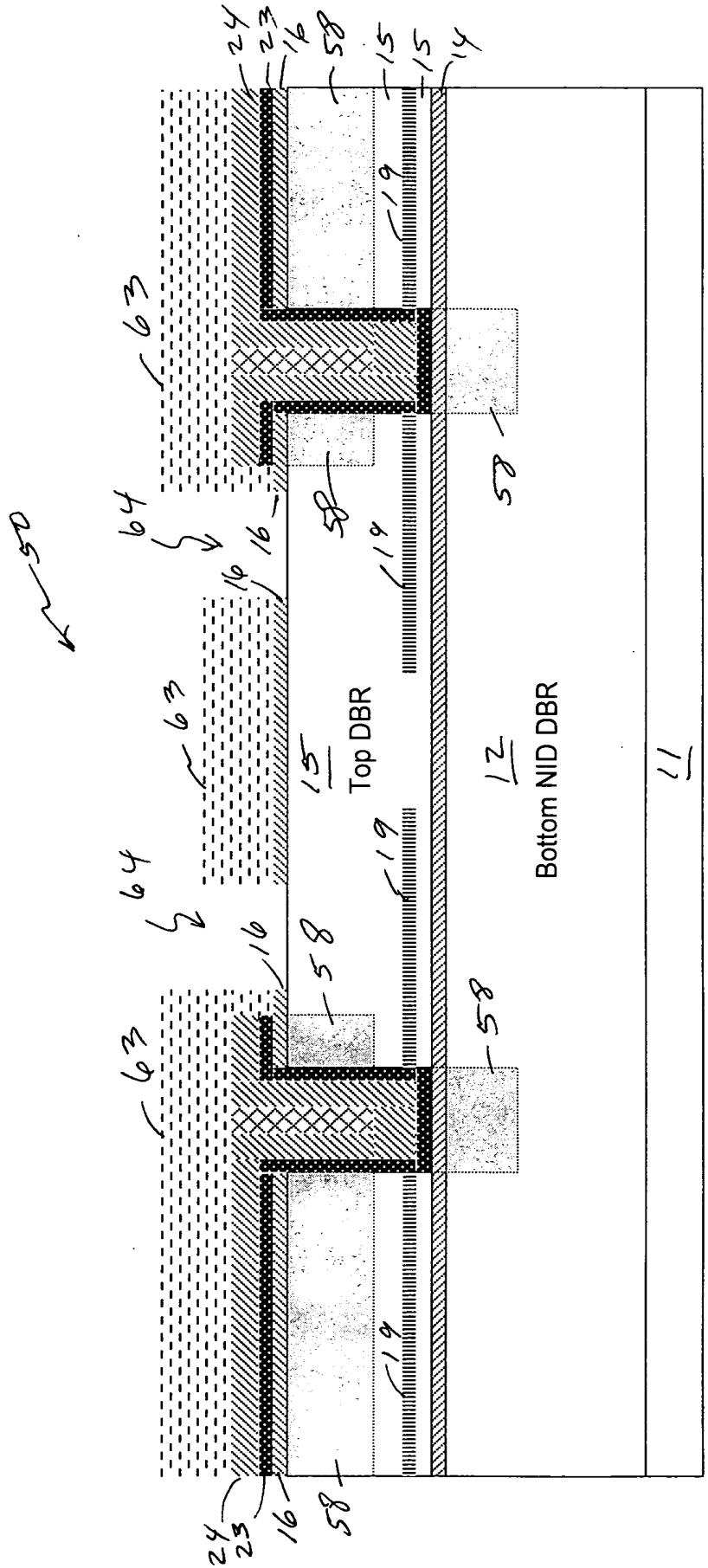


FIGURE 72

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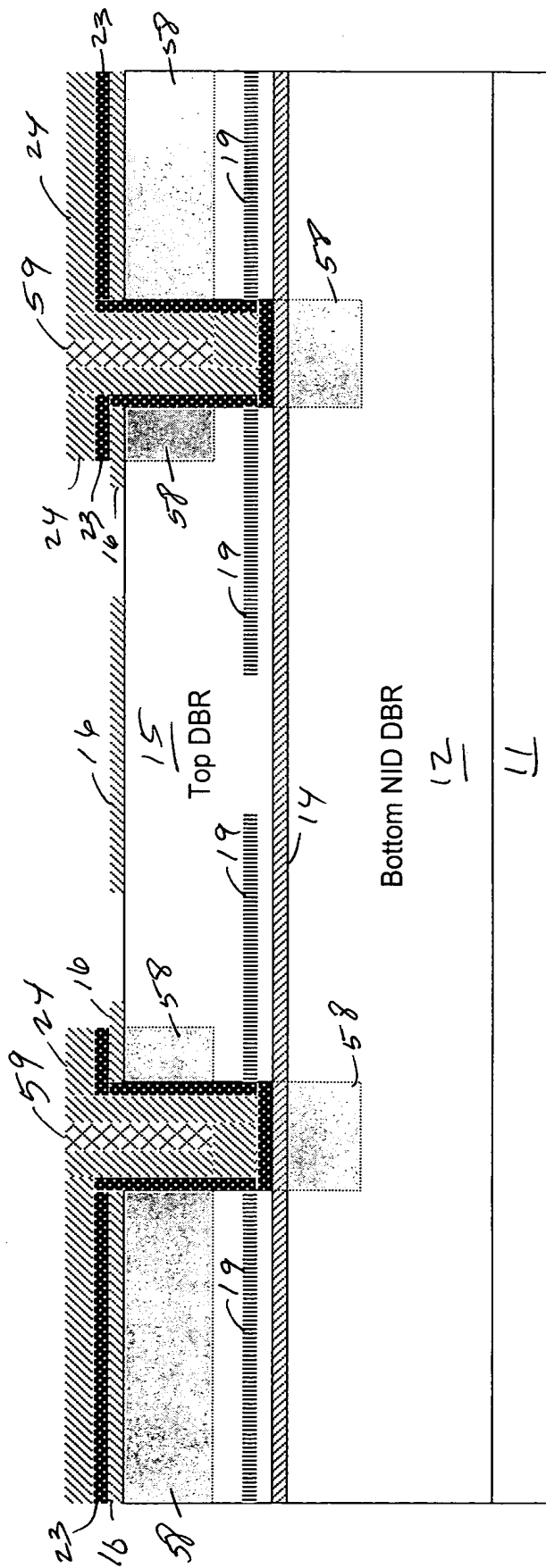


FIGURE 73

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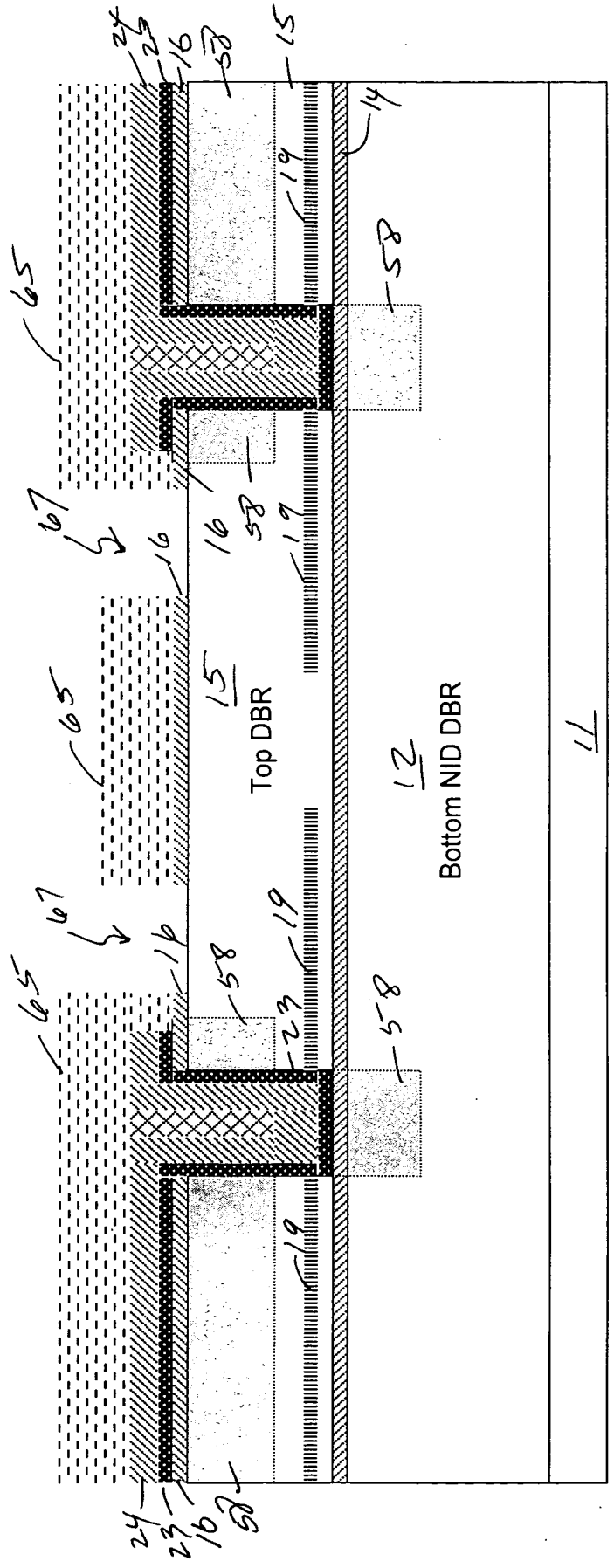


Figure 74

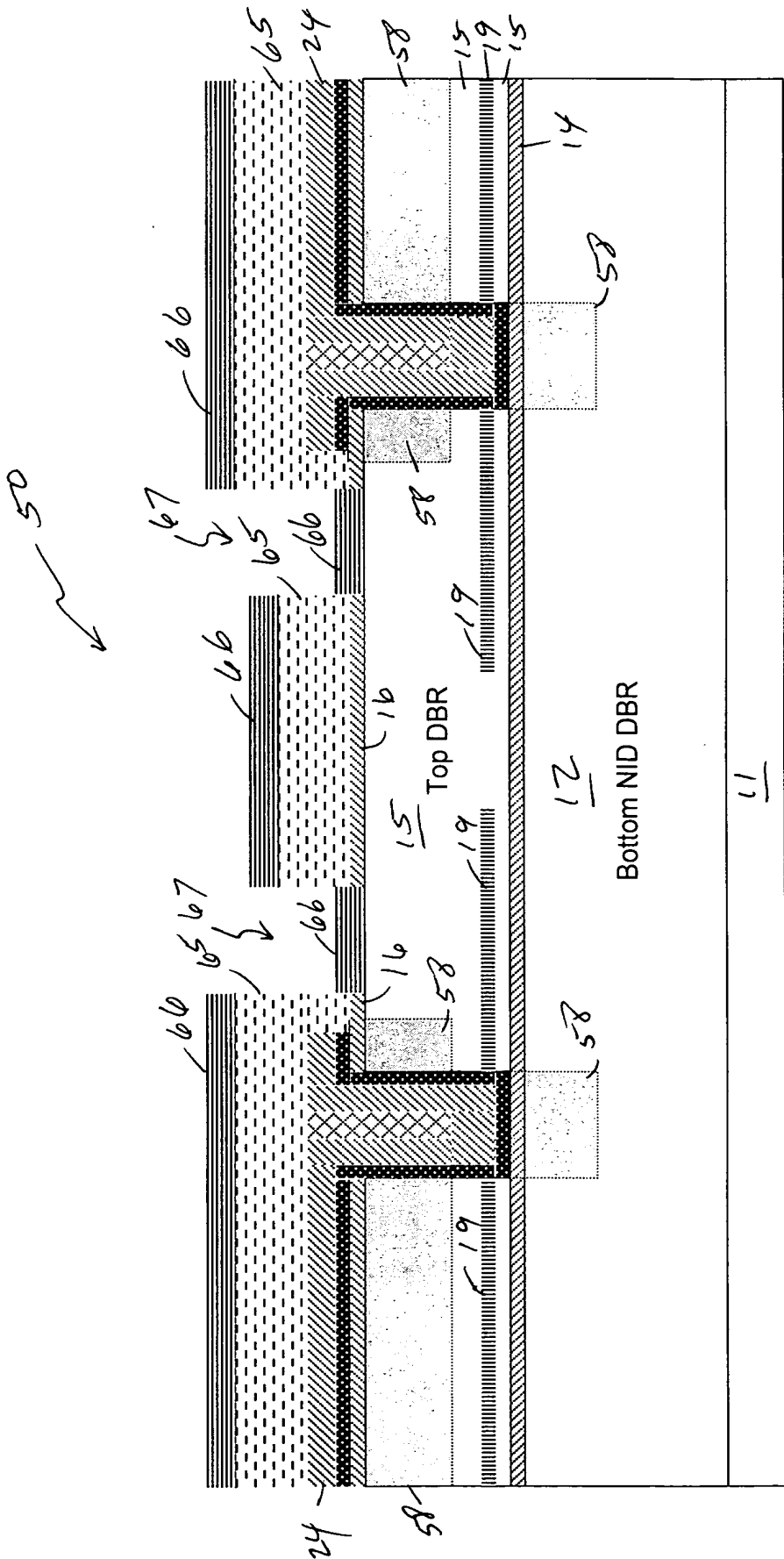
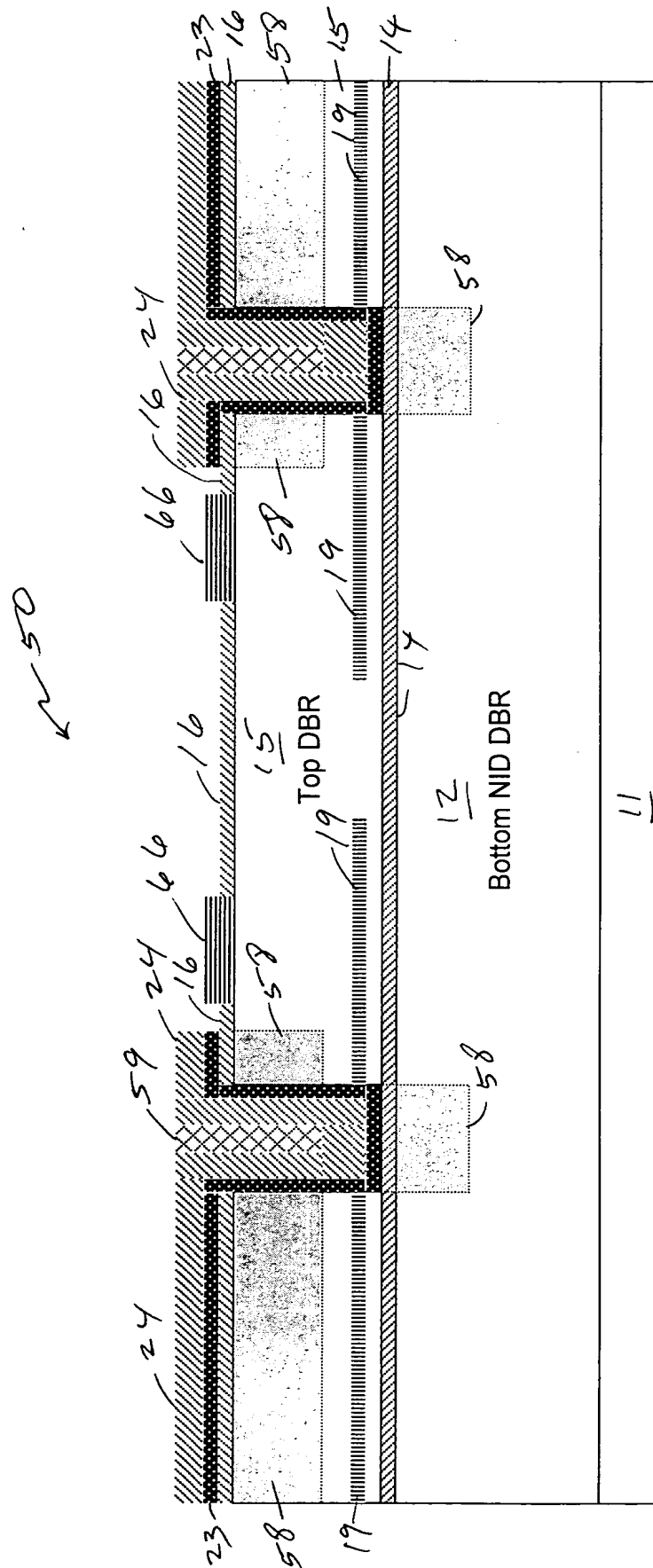
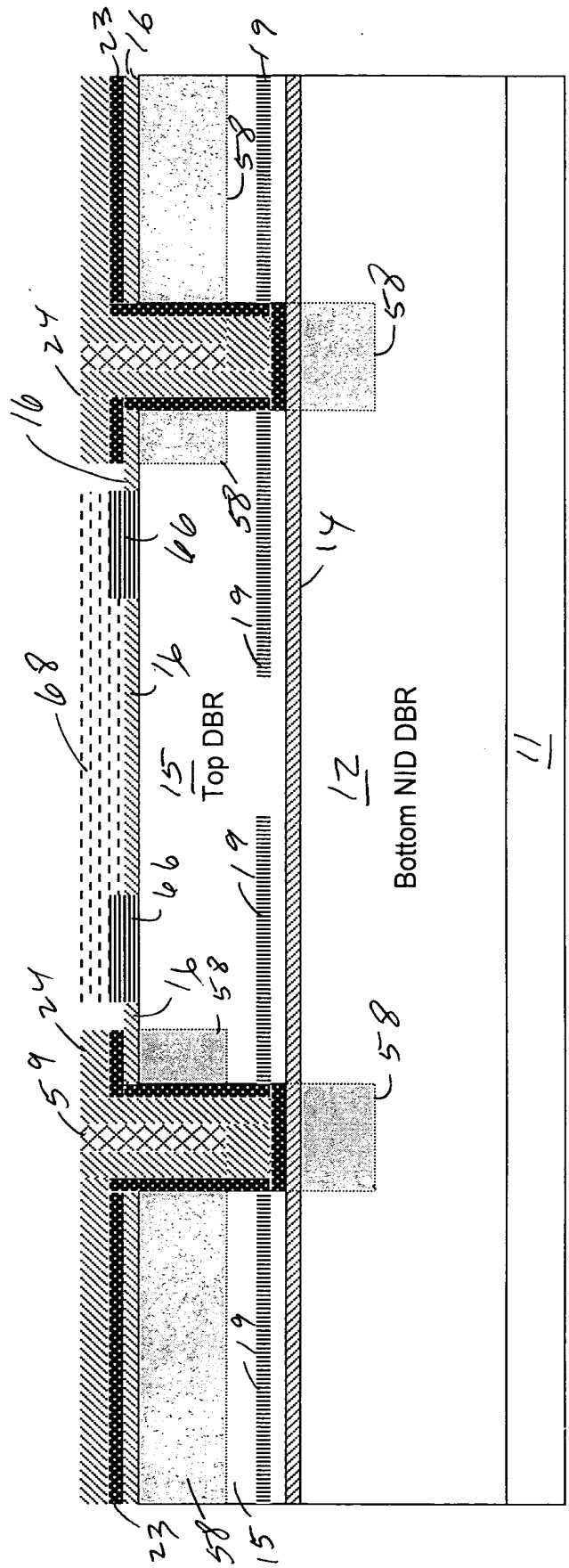


FIGURE 75

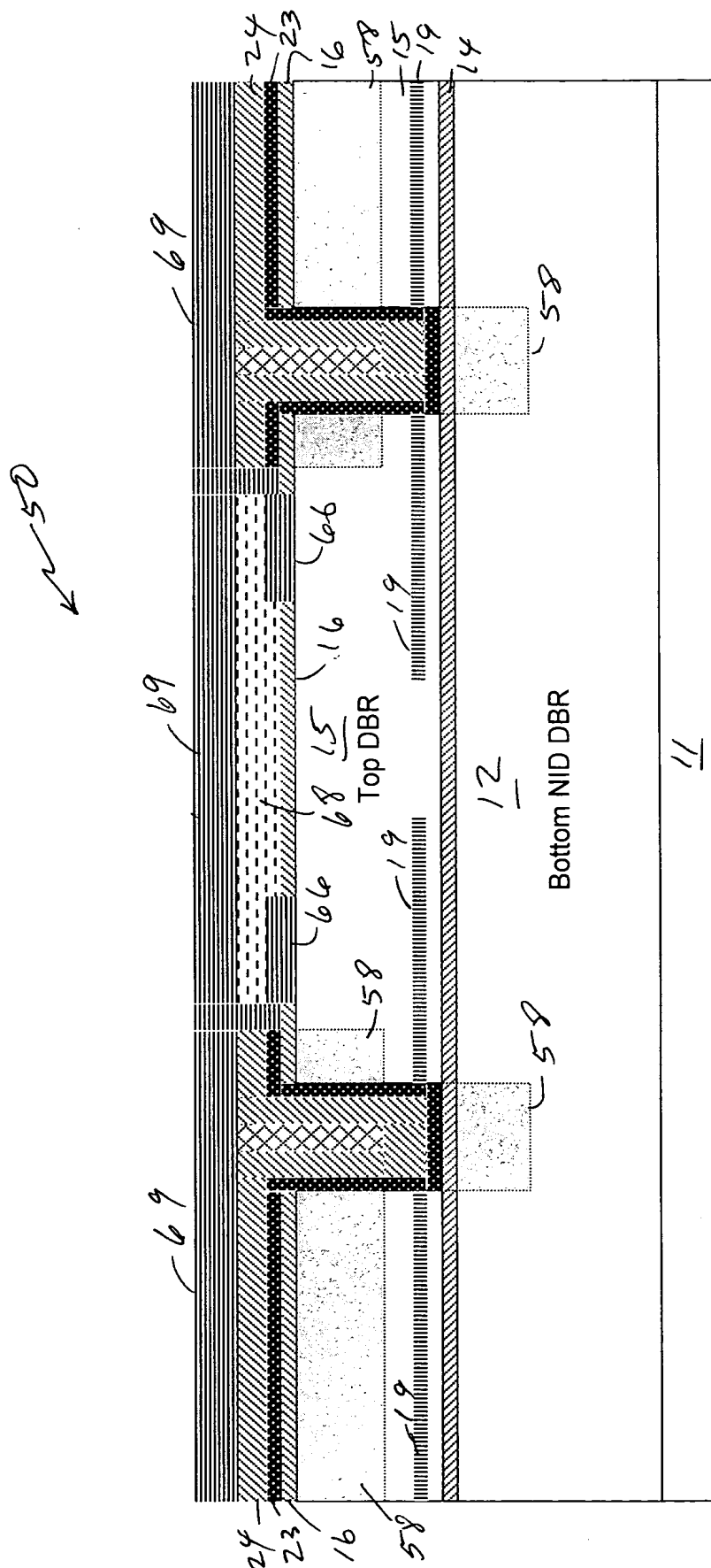


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FIGURE 77



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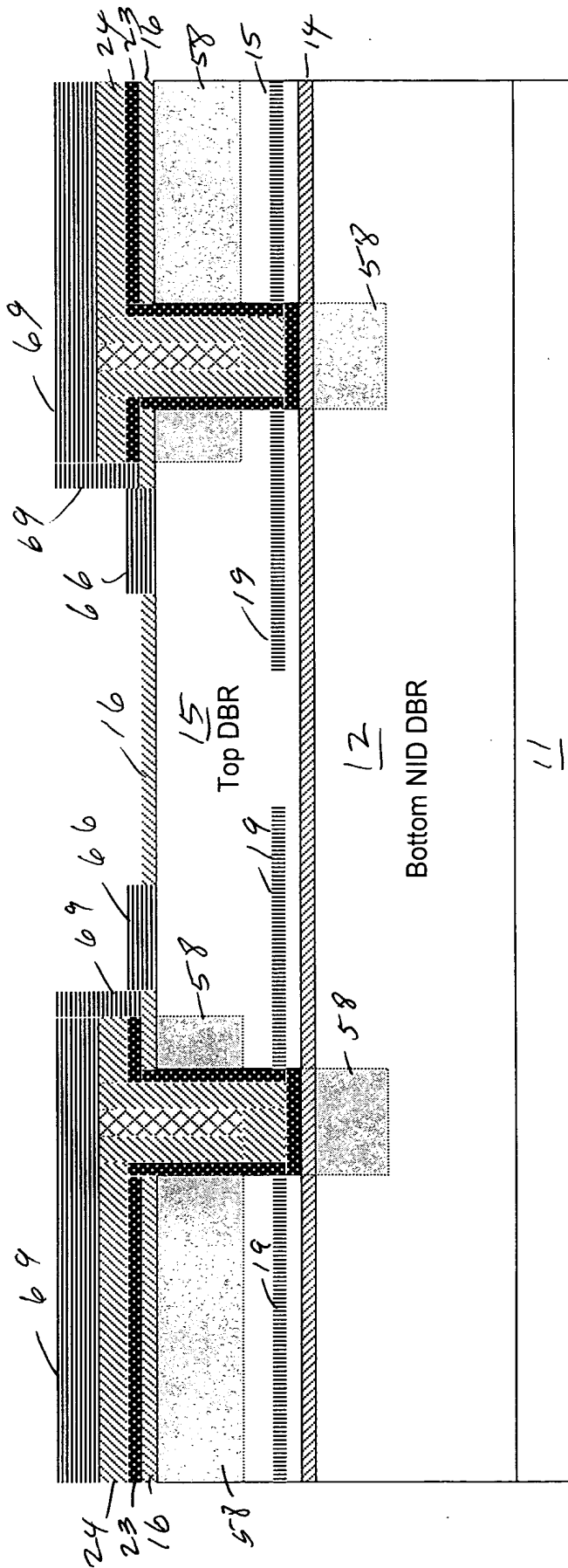


FIGURE 79

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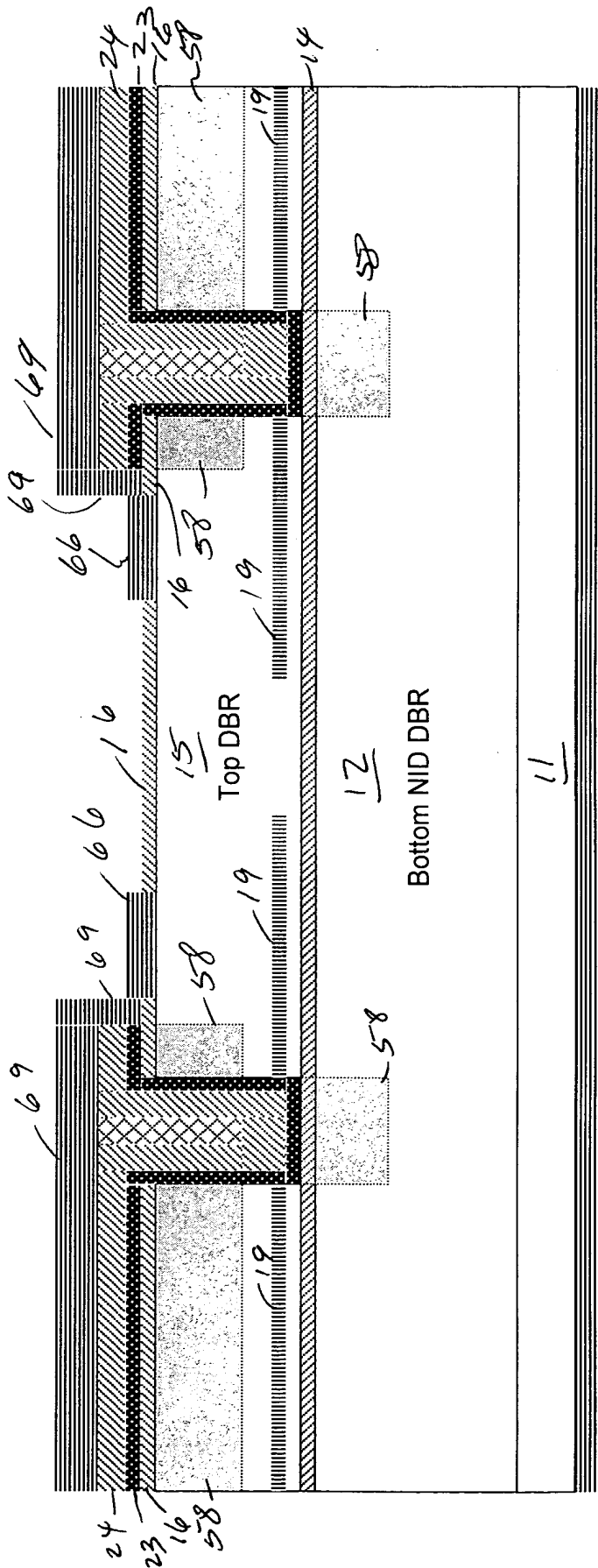


FIGURE 80

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Top DBR

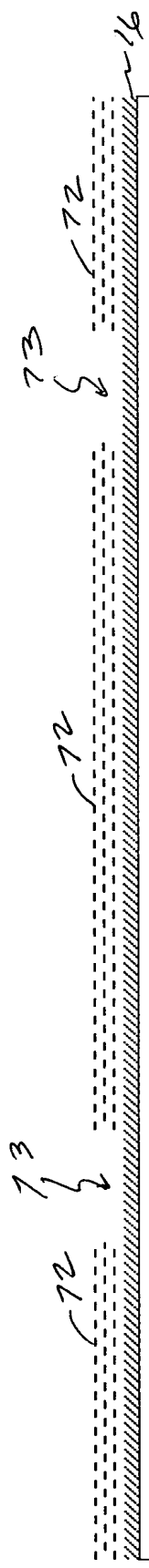
14

12
Bottom NID DBR

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FIGURE 81

2-60



15
Top DBR

12
Bottom NID DBR

11

FIGURE 82

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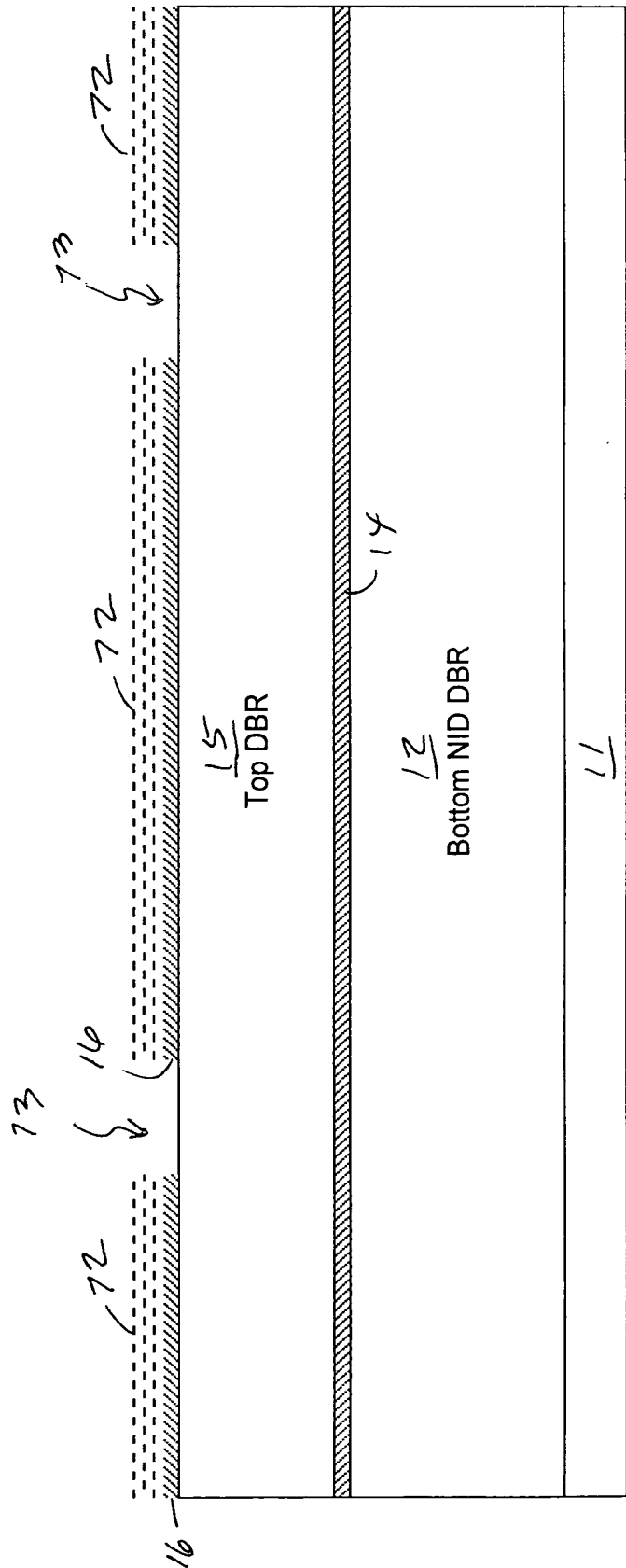


FIGURE 83

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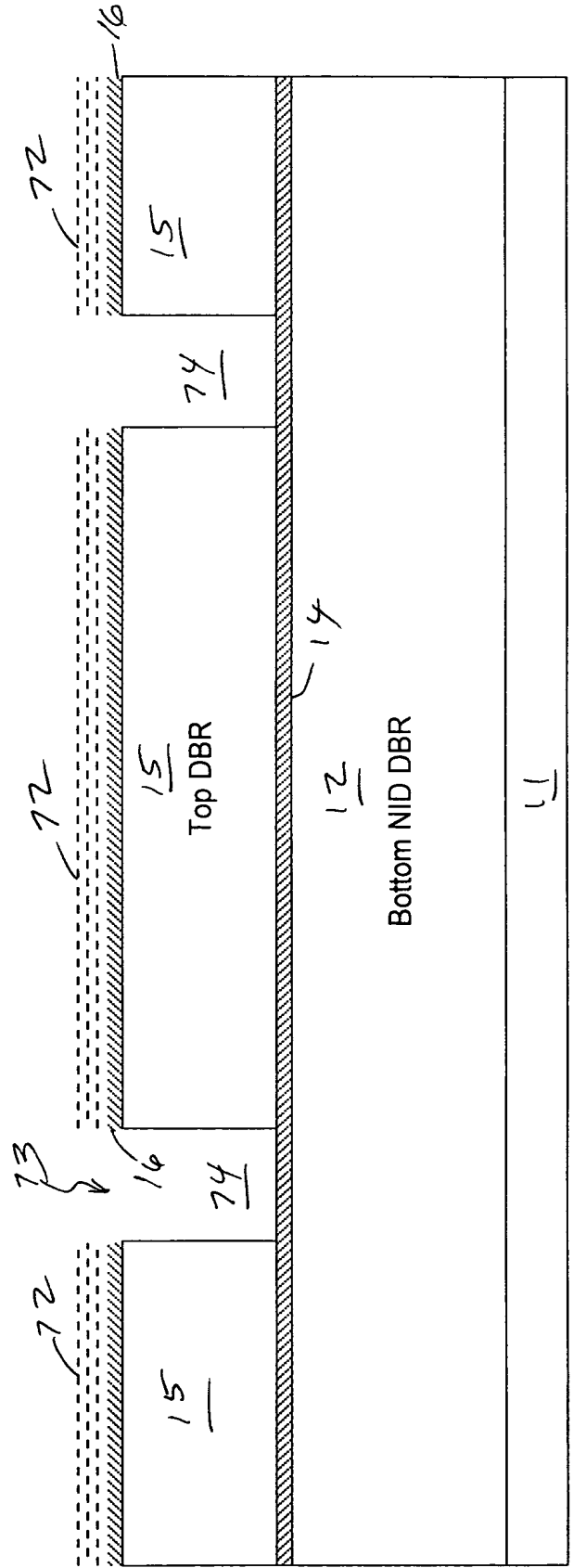


FIGURE 84

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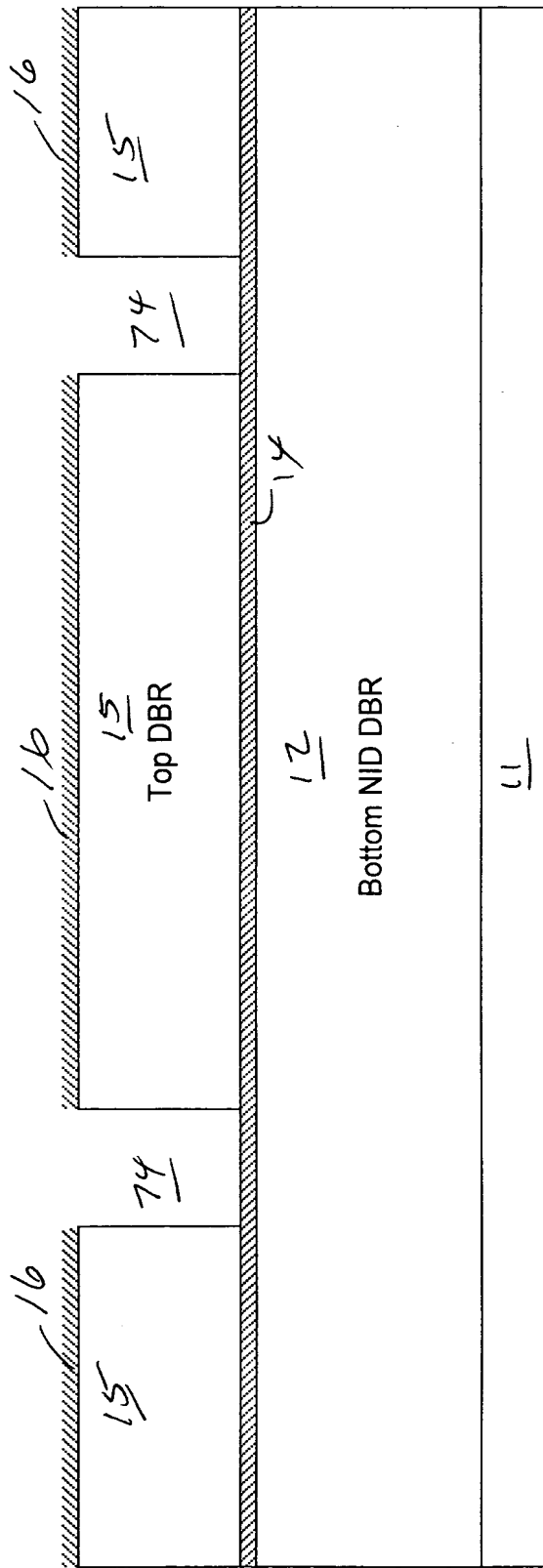


FIGURE 85

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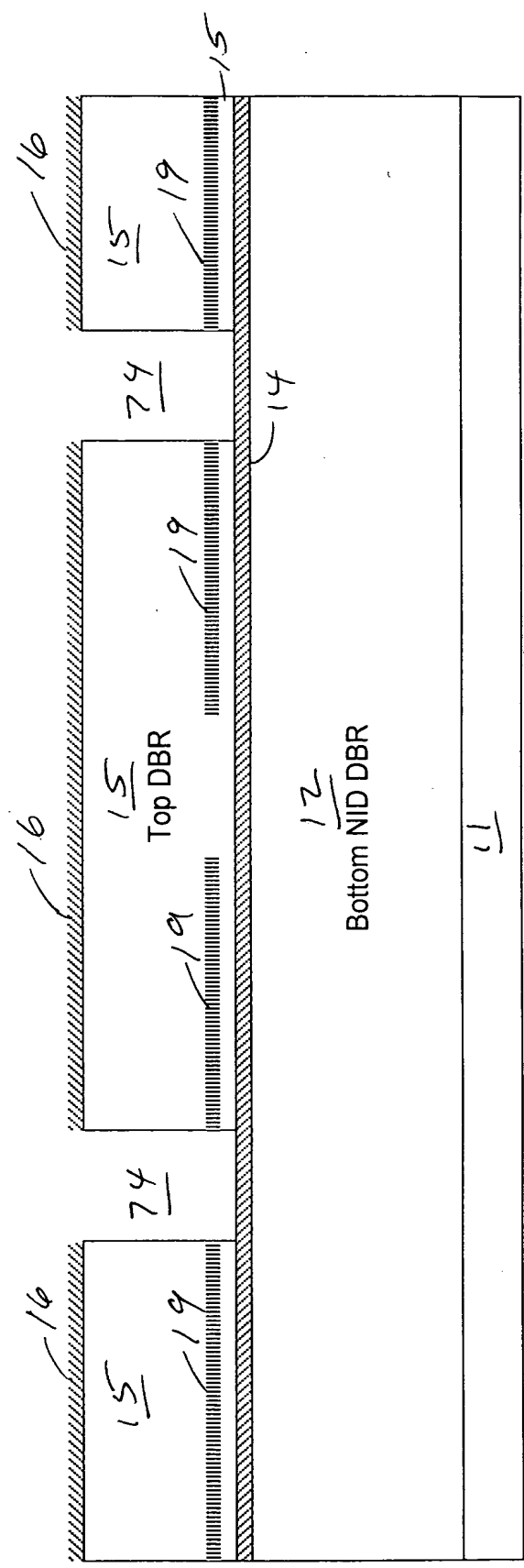
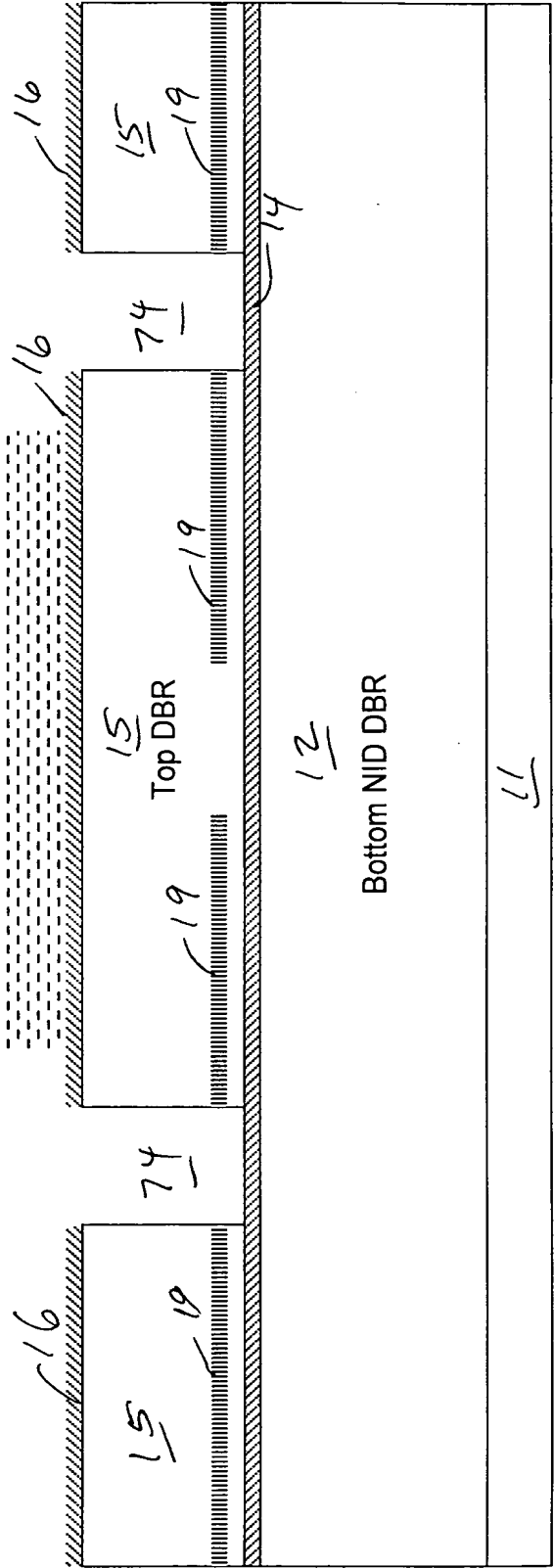


FIGURE 86

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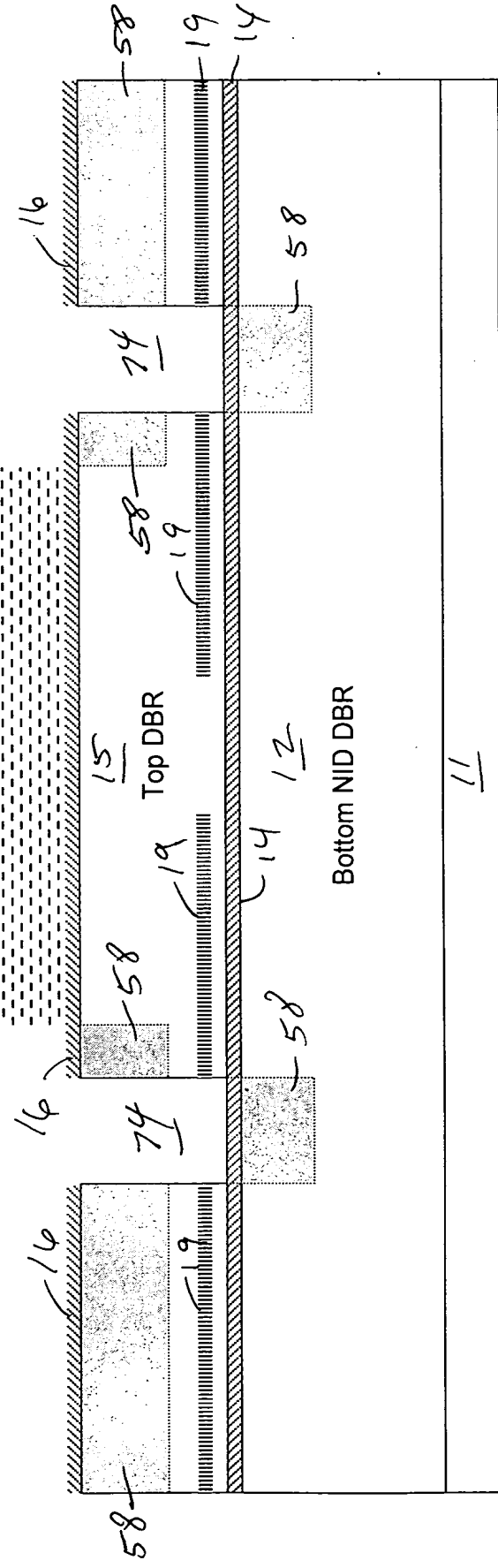
75 ↗



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FIGURE 87

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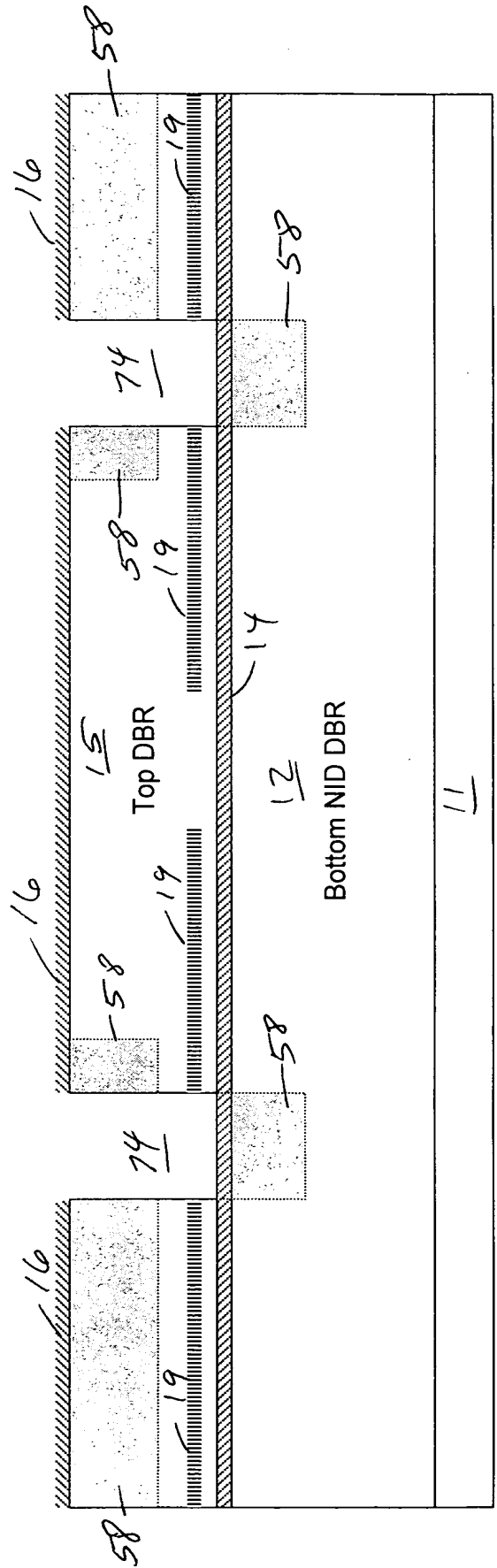
75 ↗



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FIGURE 88

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FIGURE 89

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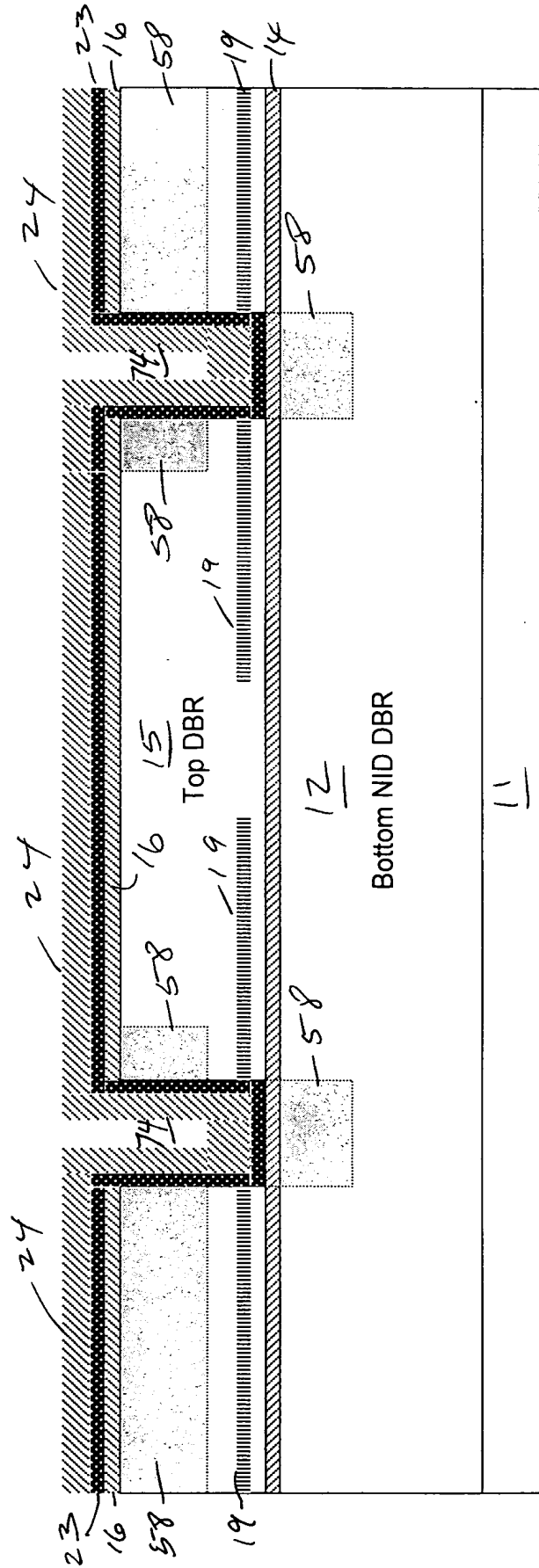
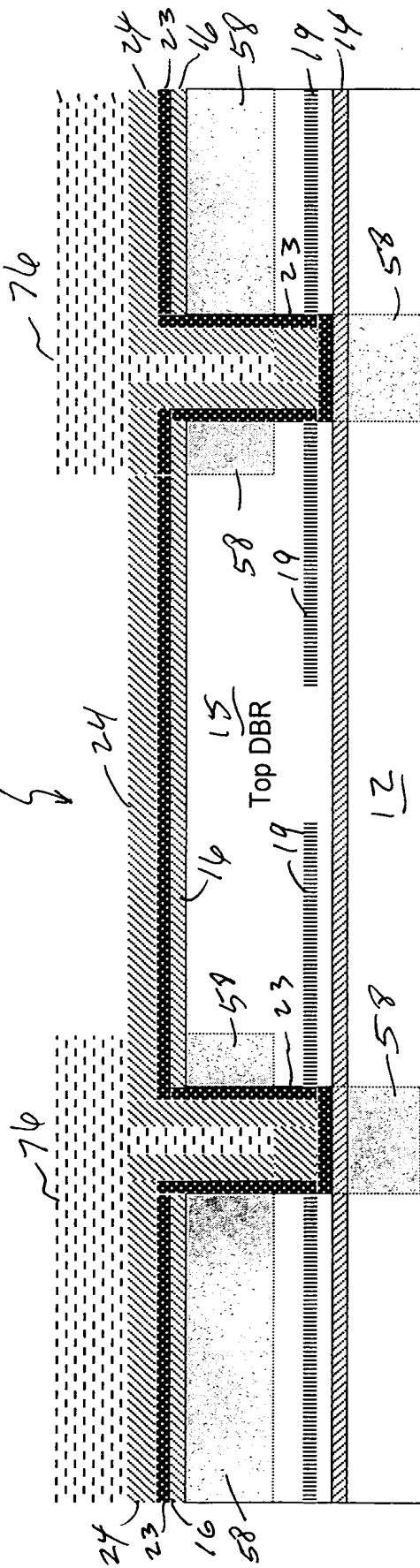


FIGURE 91

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Bottom NID DBR

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FIGURE 92

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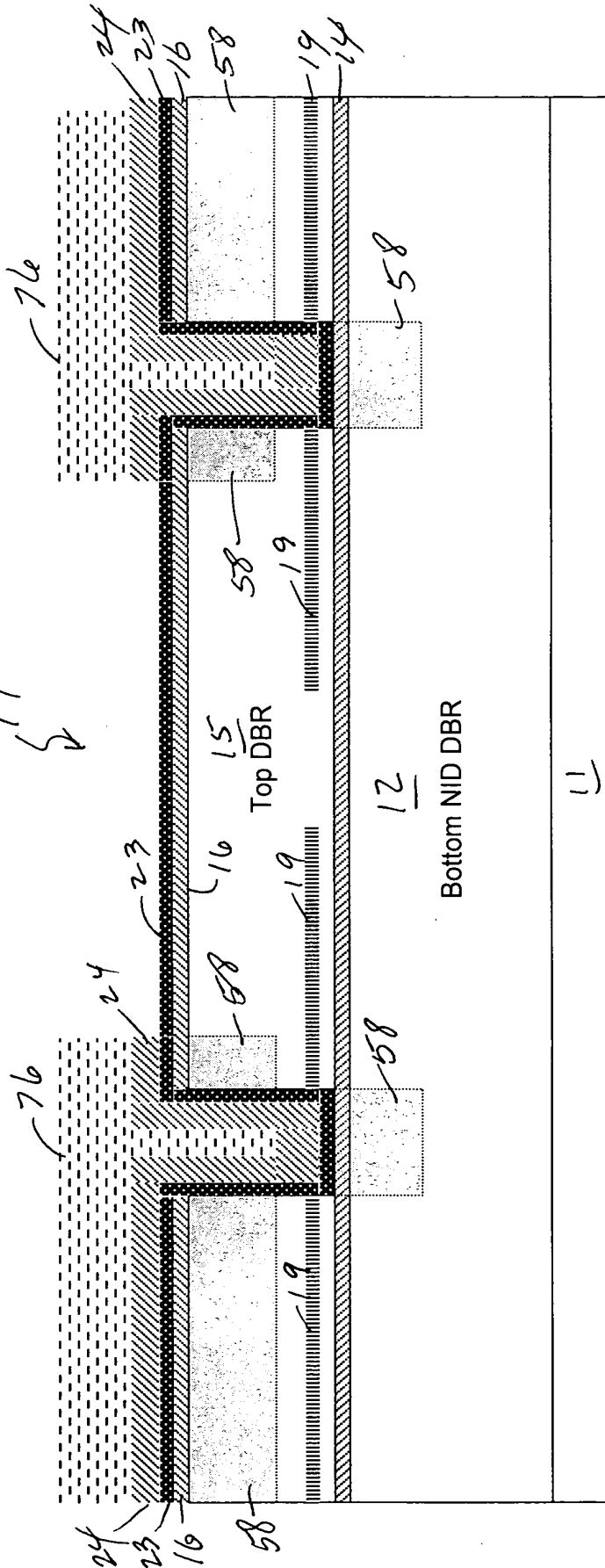


FIGURE 93

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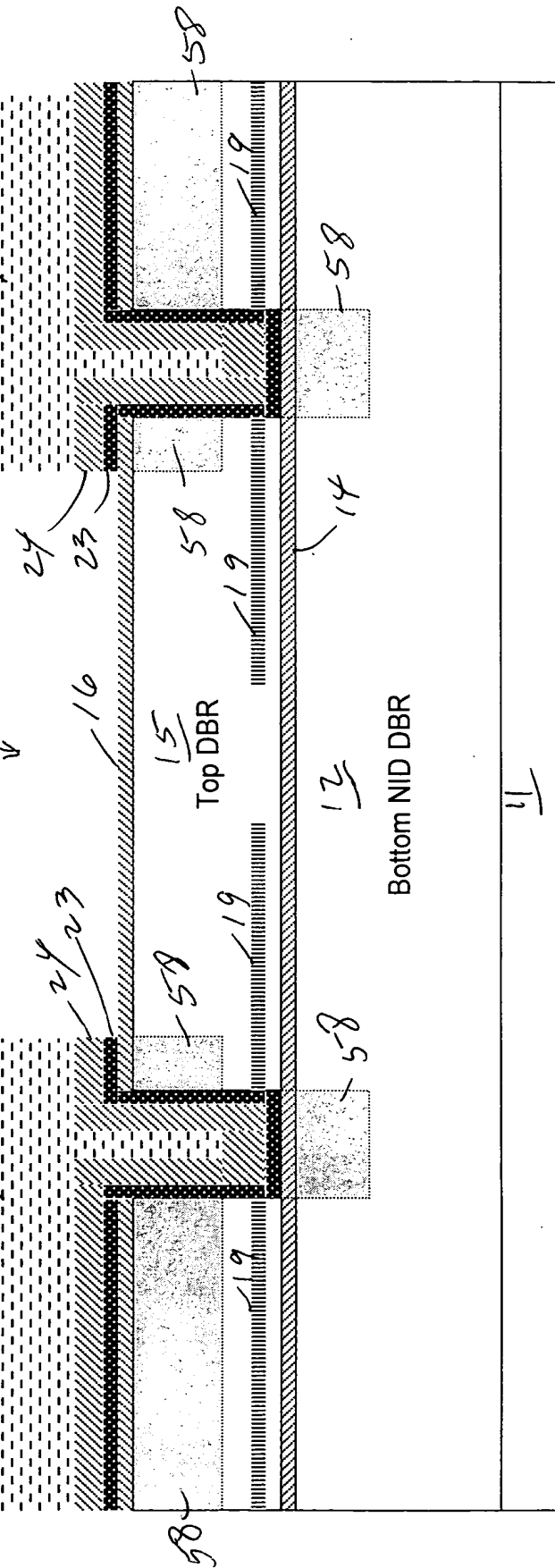
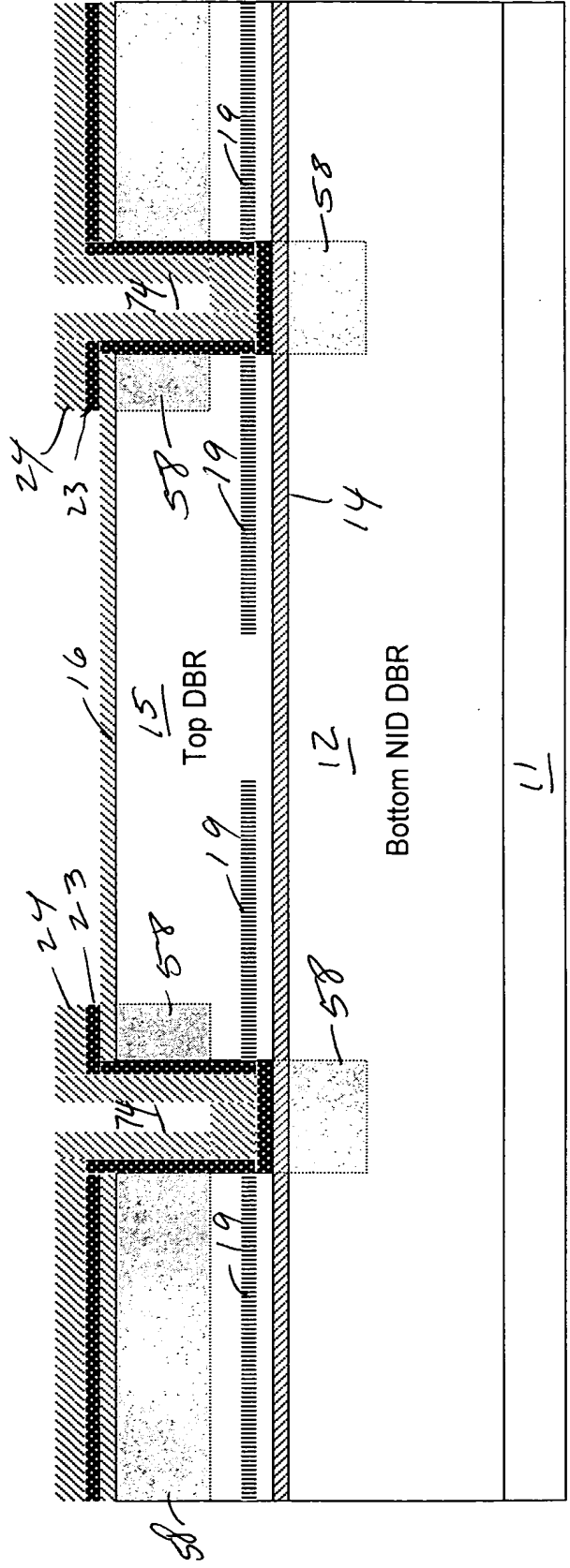


FIGURE 94

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FIGURE 95

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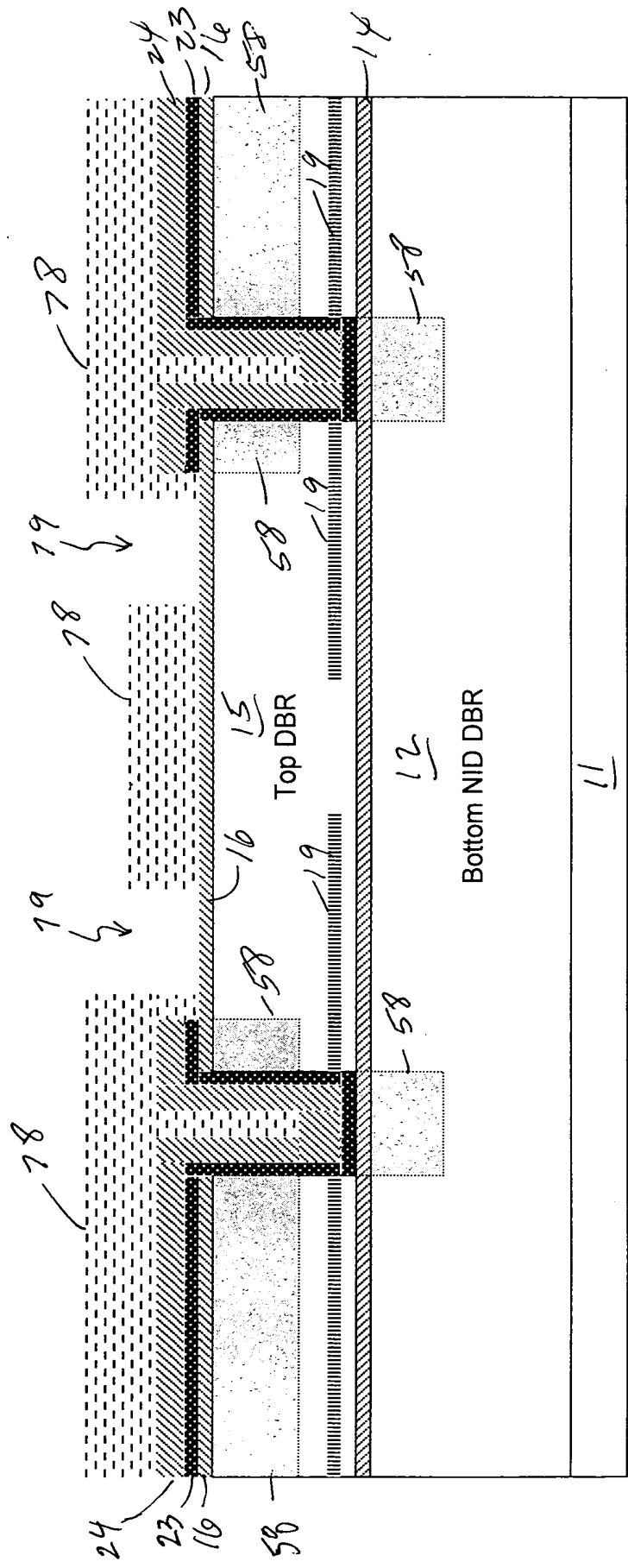


FIGURE 96

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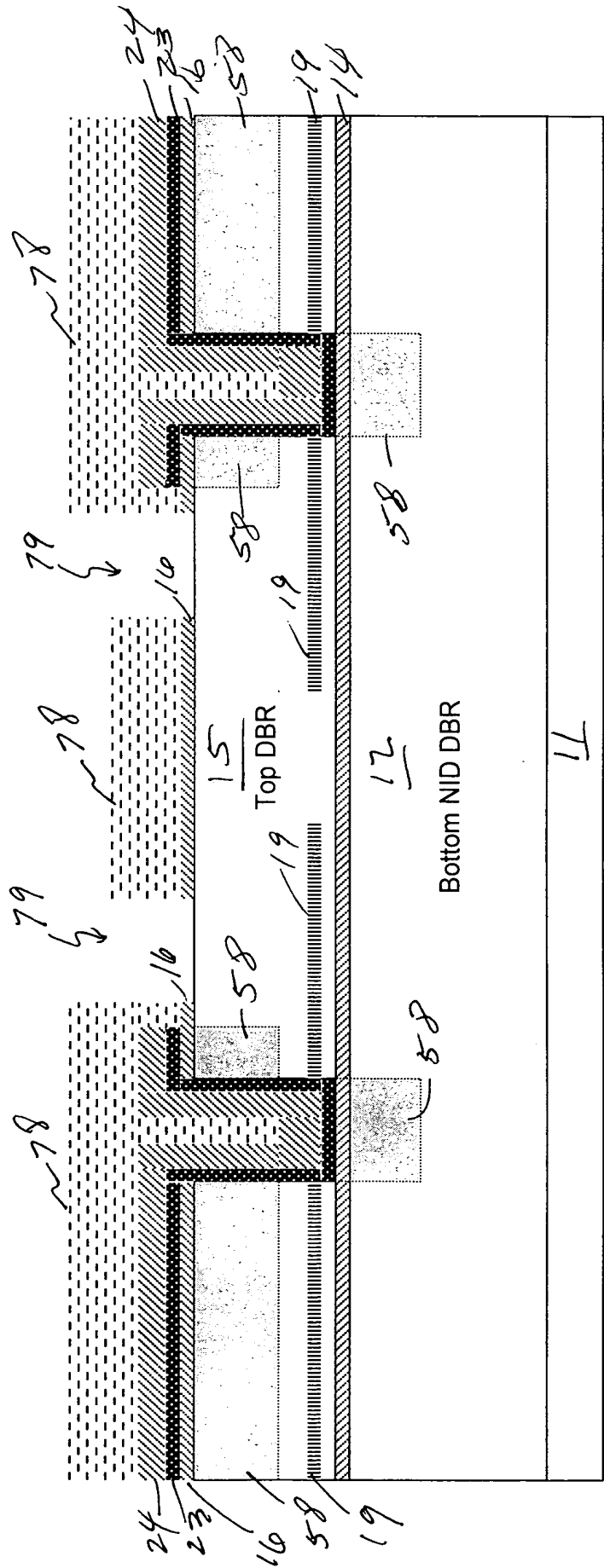


FIGURE 97

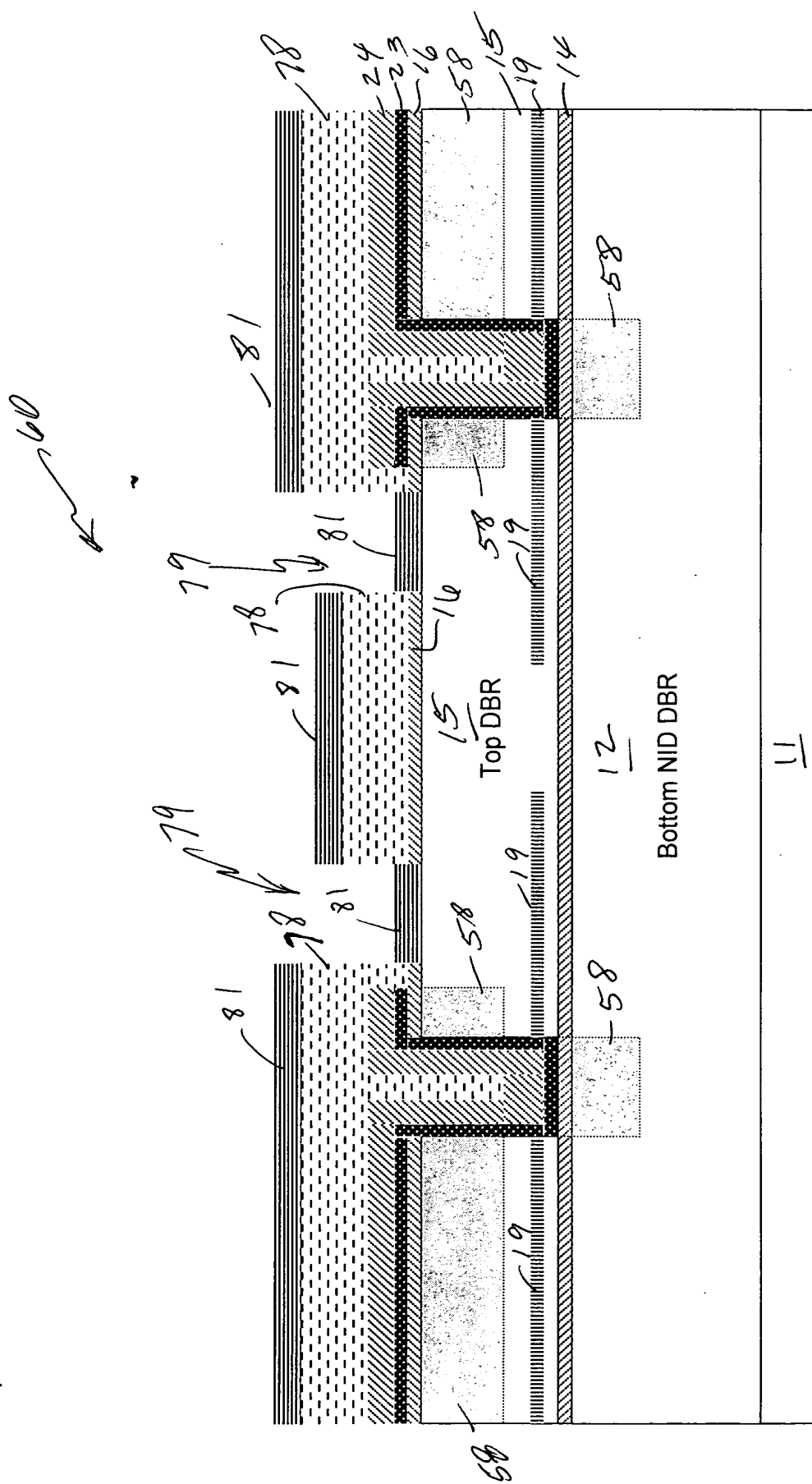
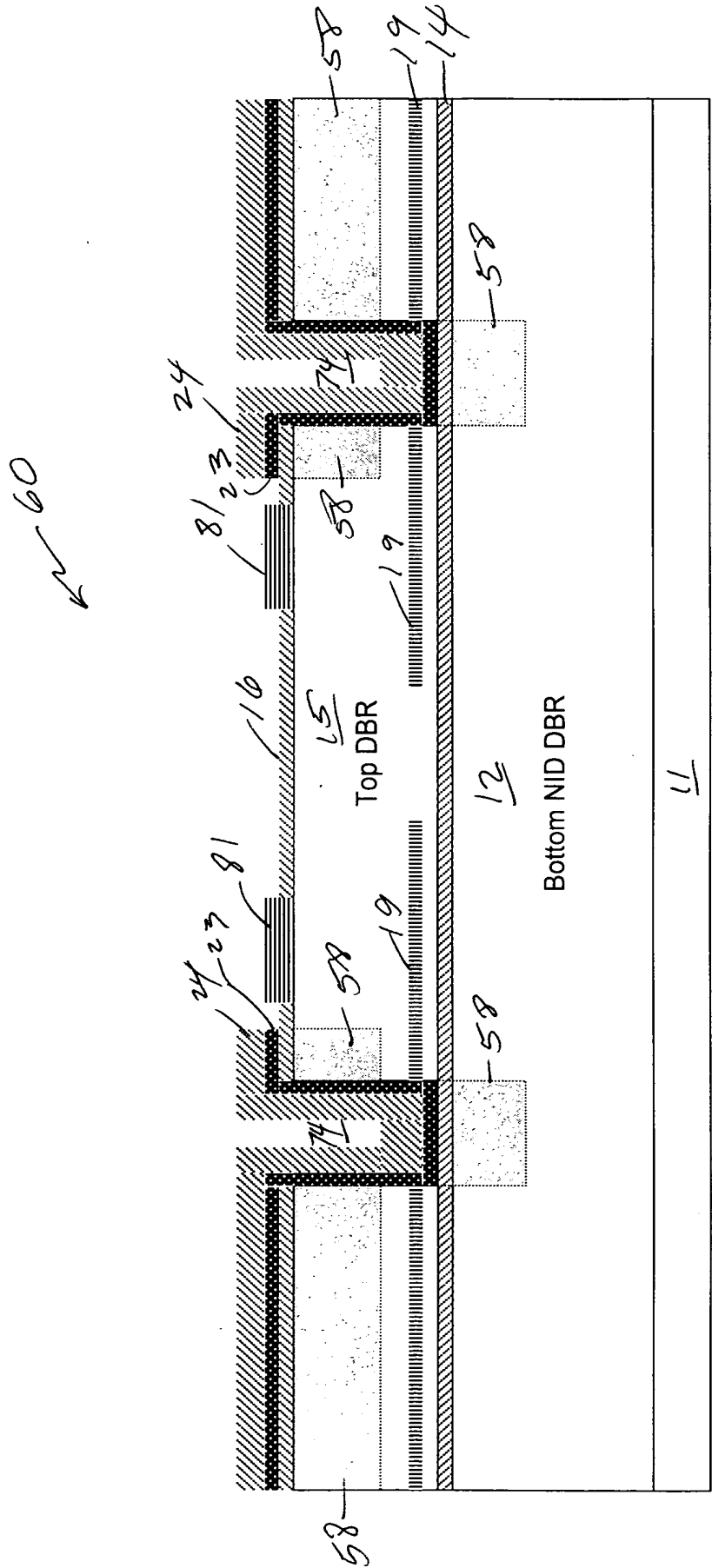


FIGURE 98



[illegible]

FIGURE 100

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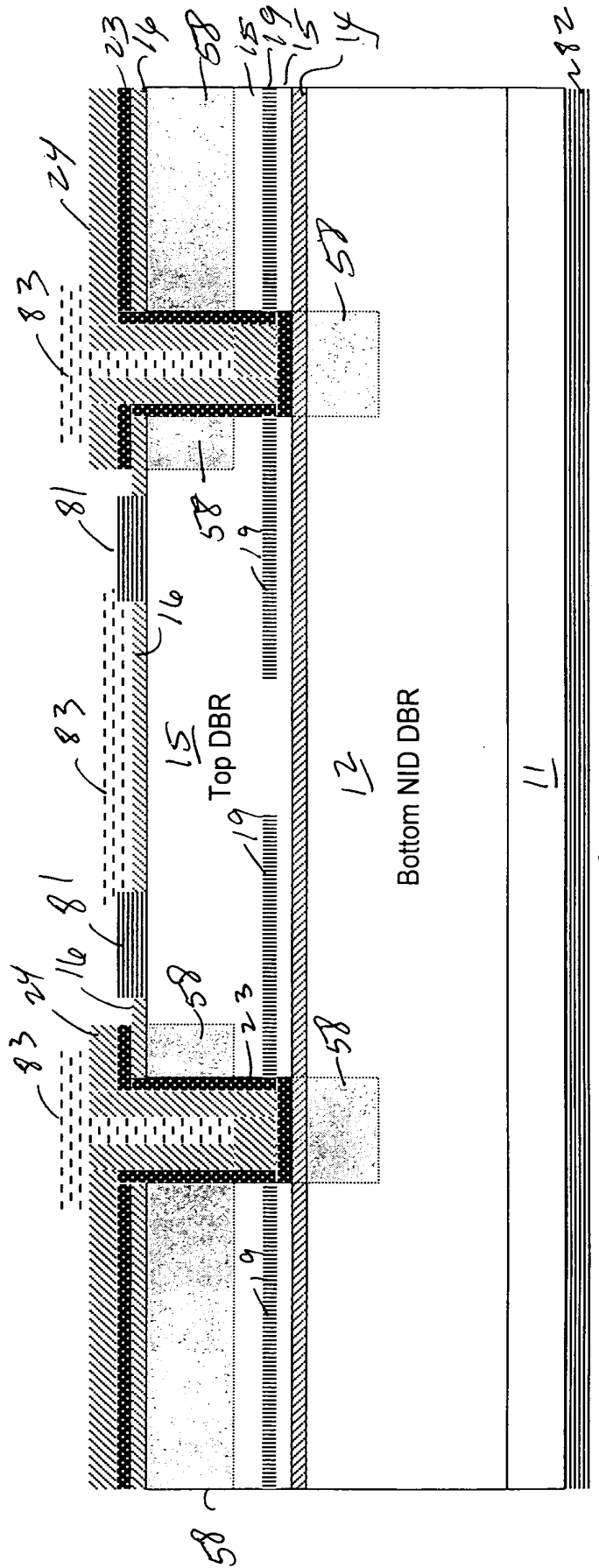


FIGURE 101

FIG 60

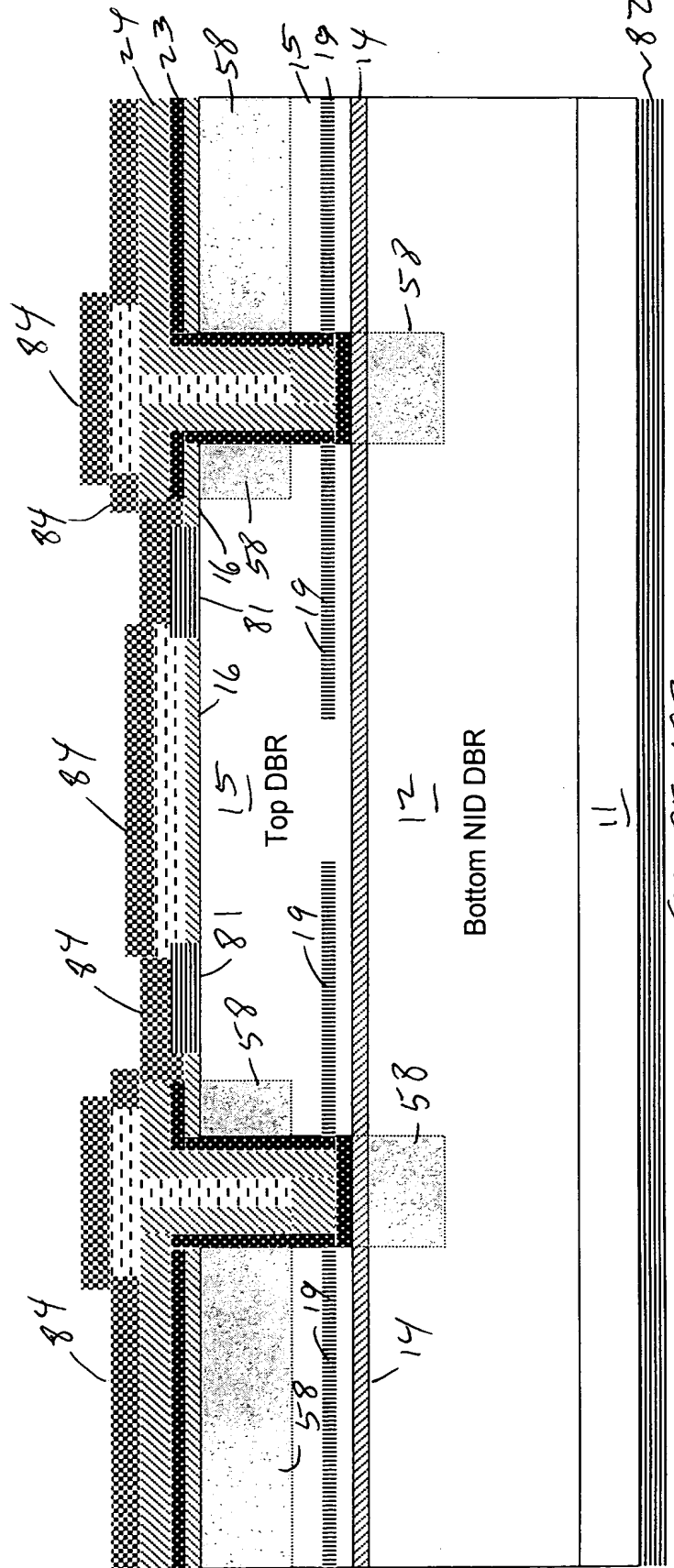
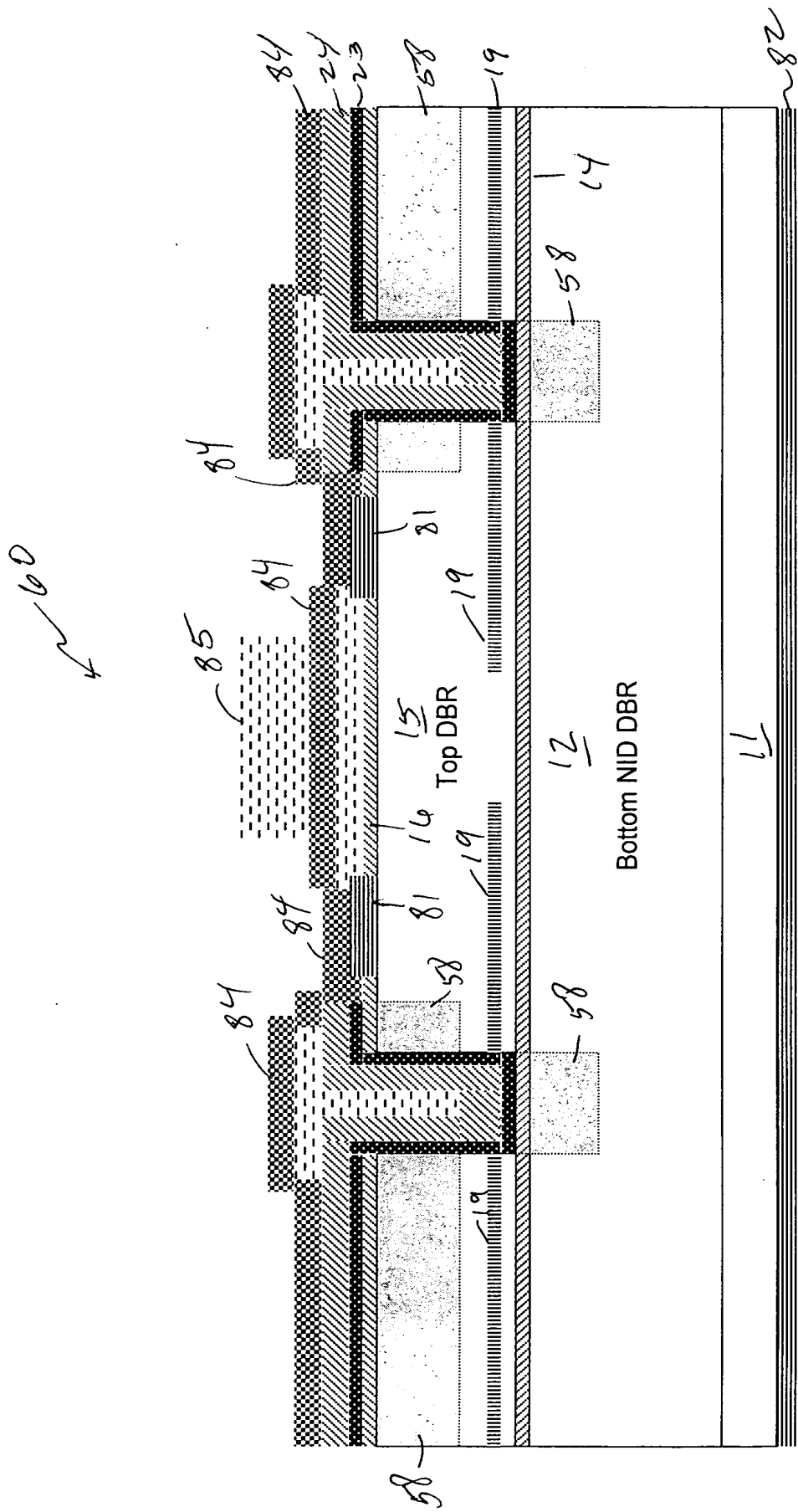
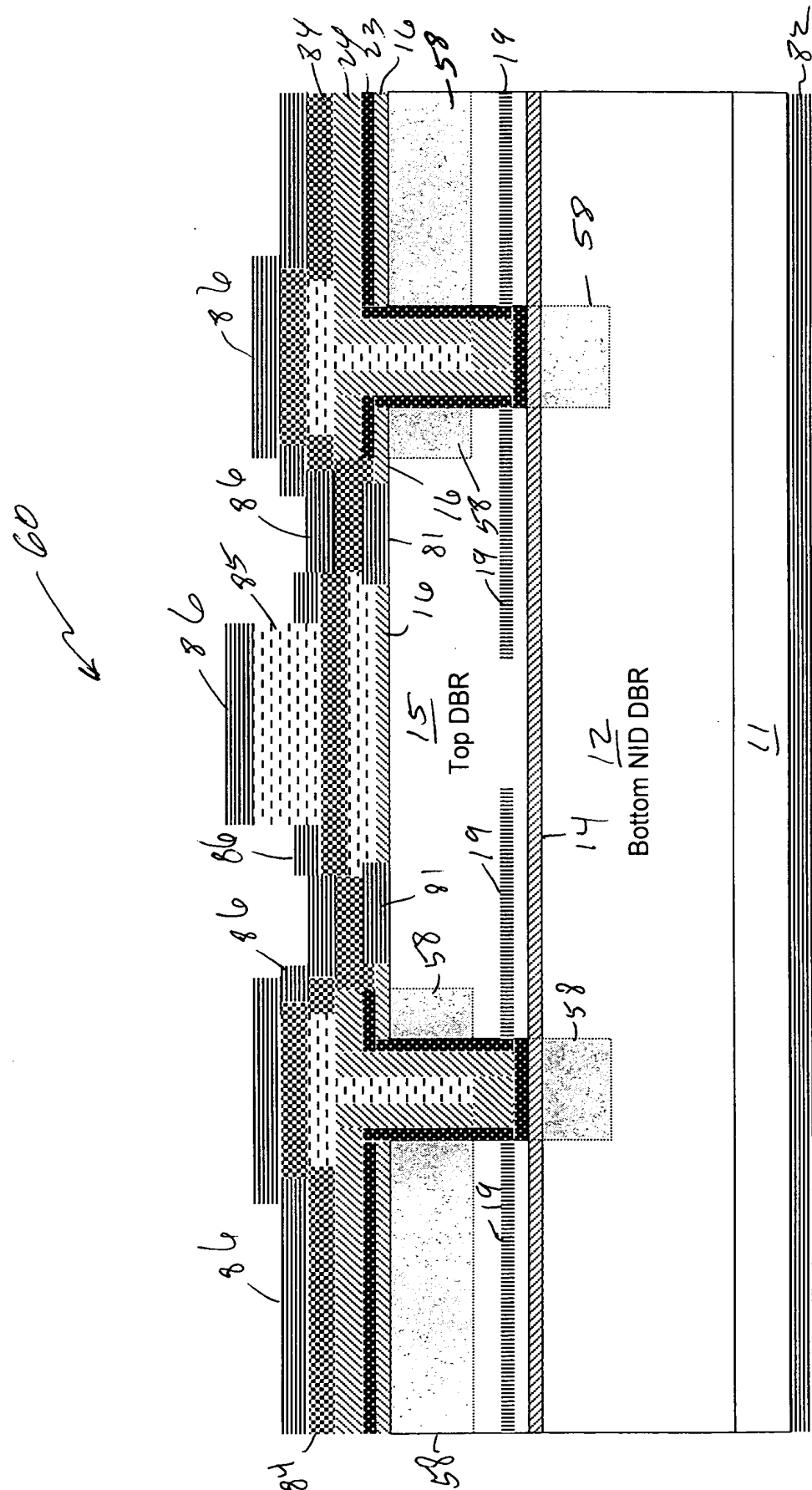


FIGURE 102





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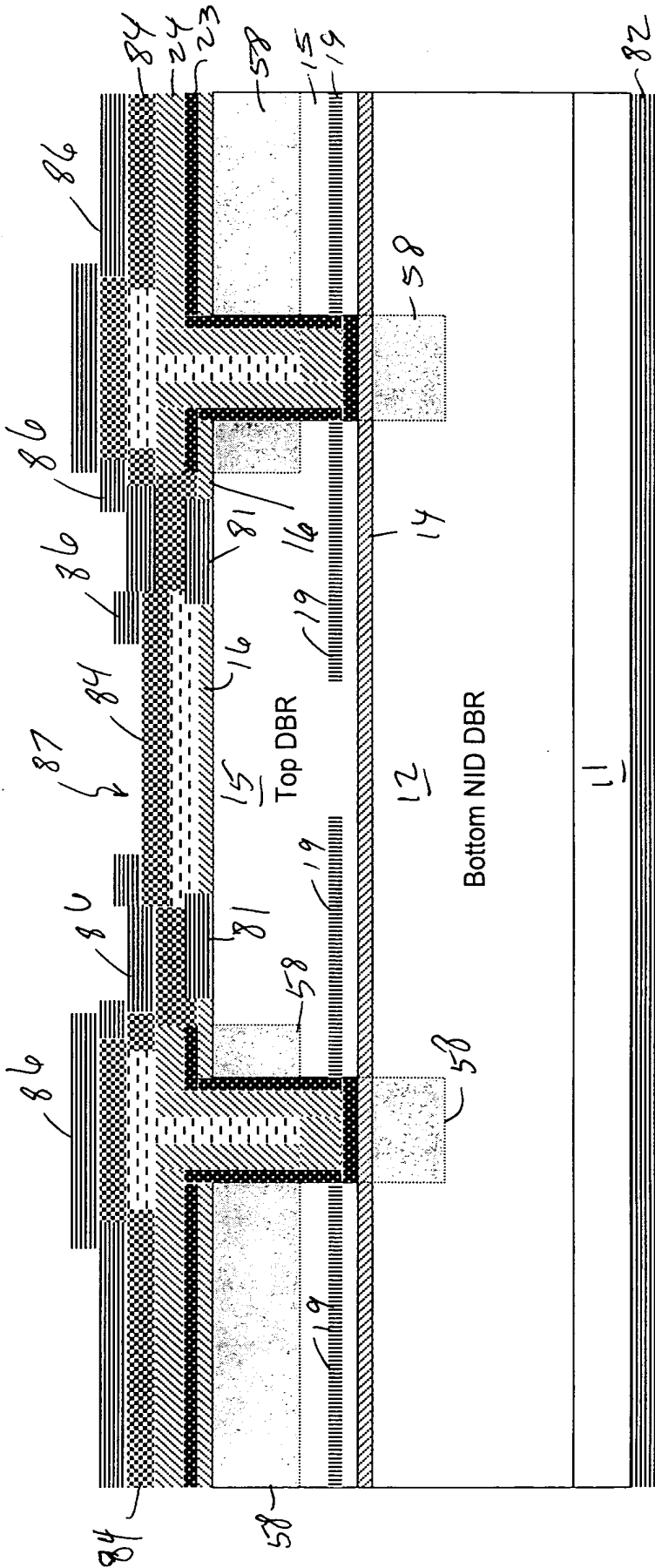


FIGURE 105

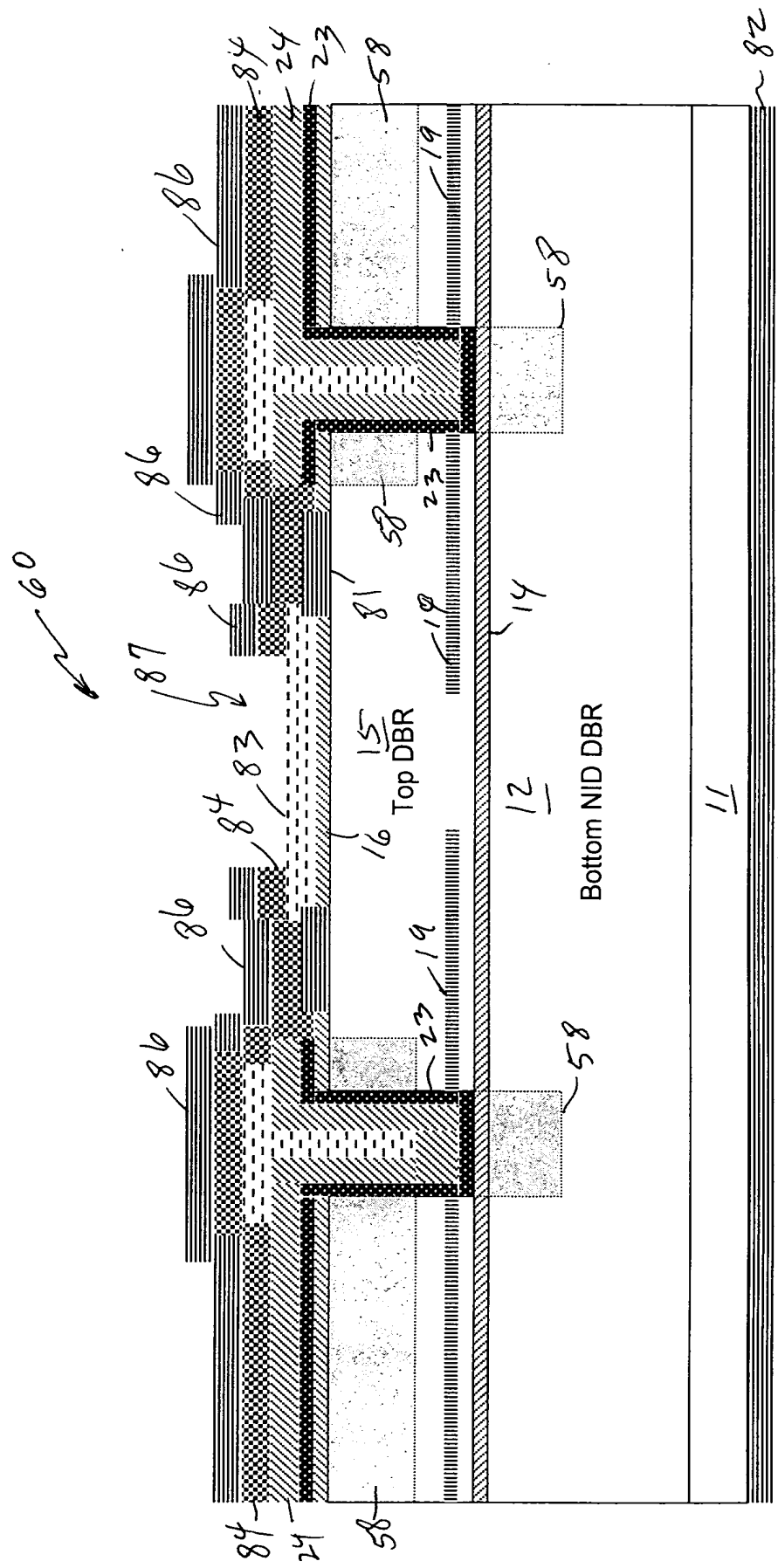


FIGURE 106

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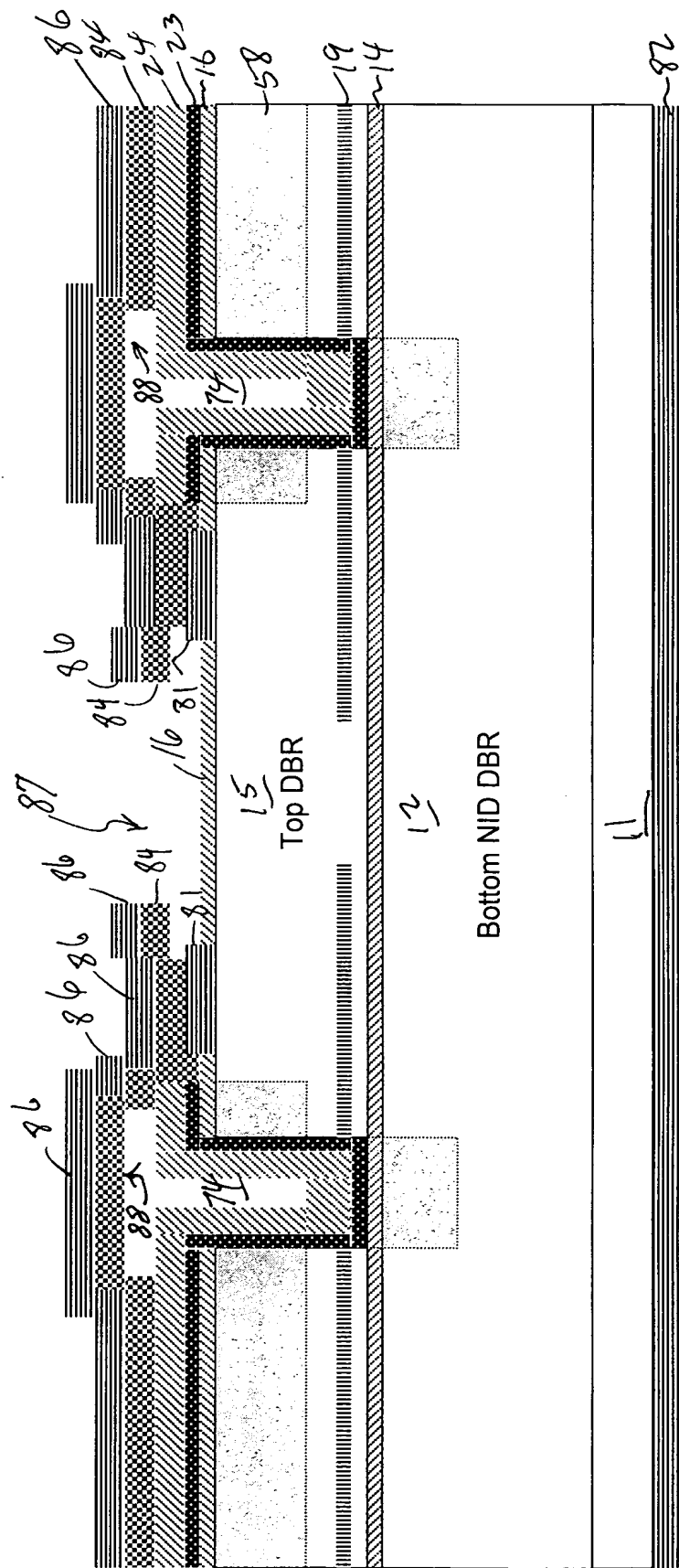


FIGURE 107

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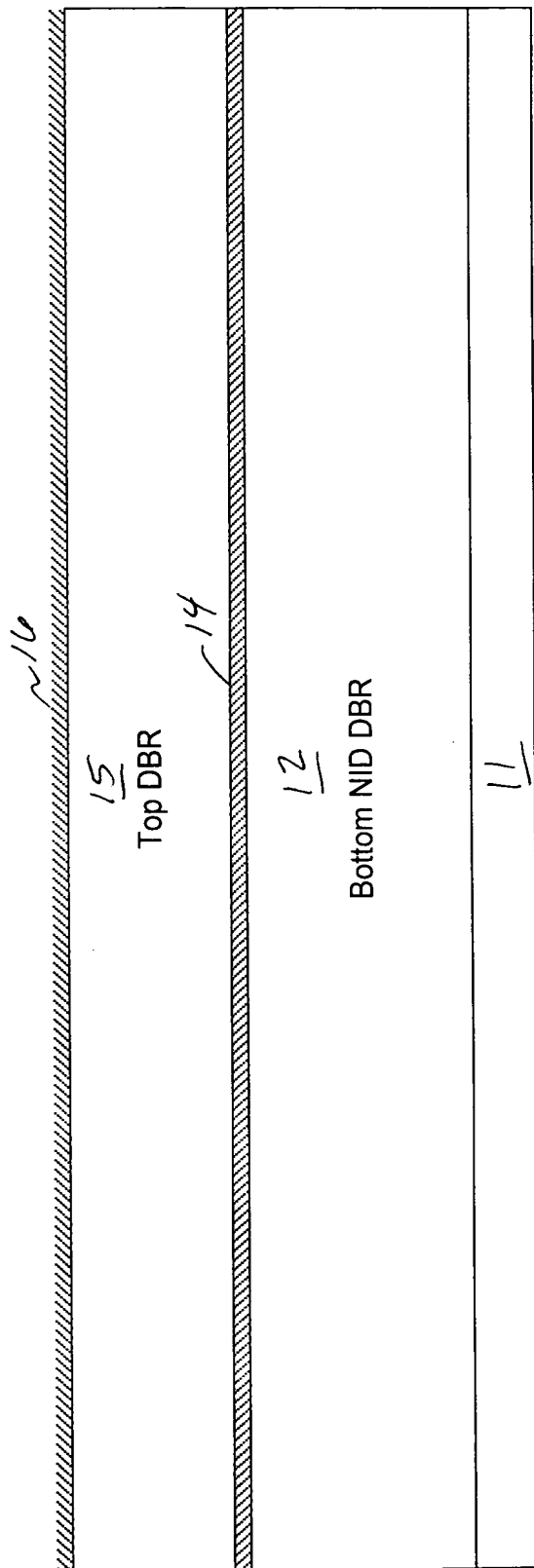


FIGURE 108

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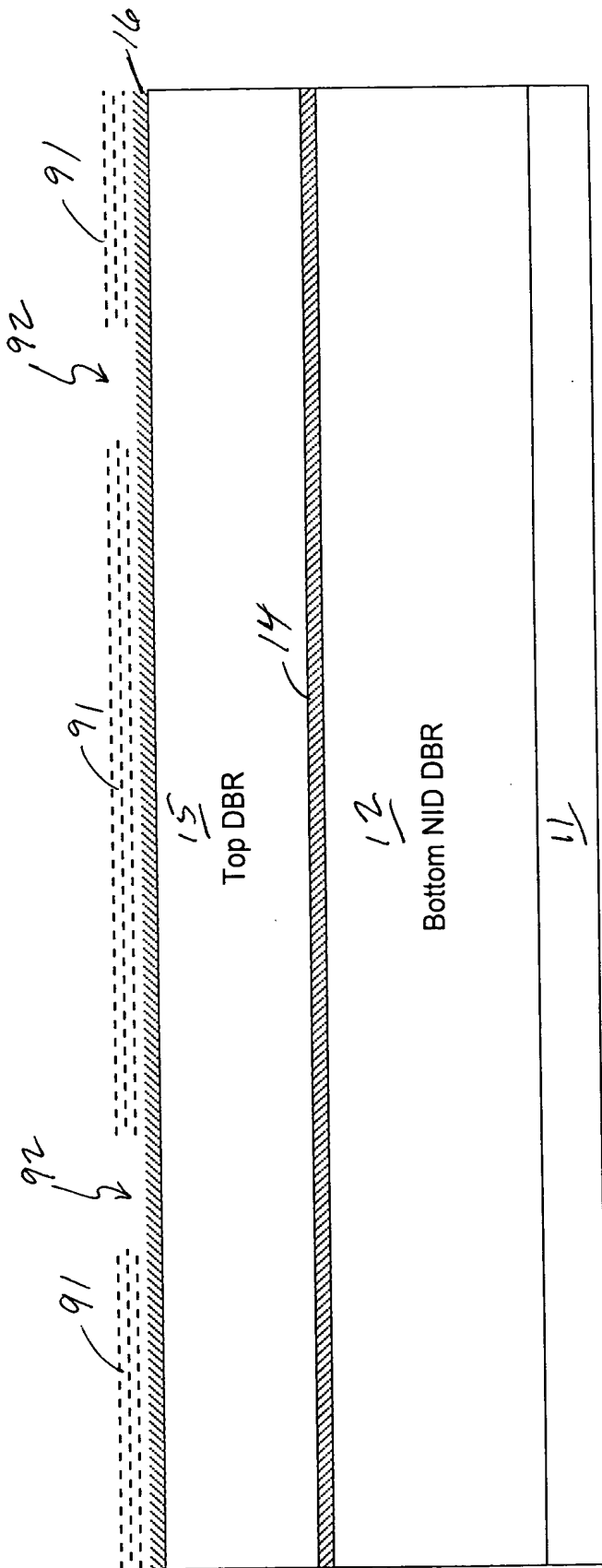


FIGURE 109

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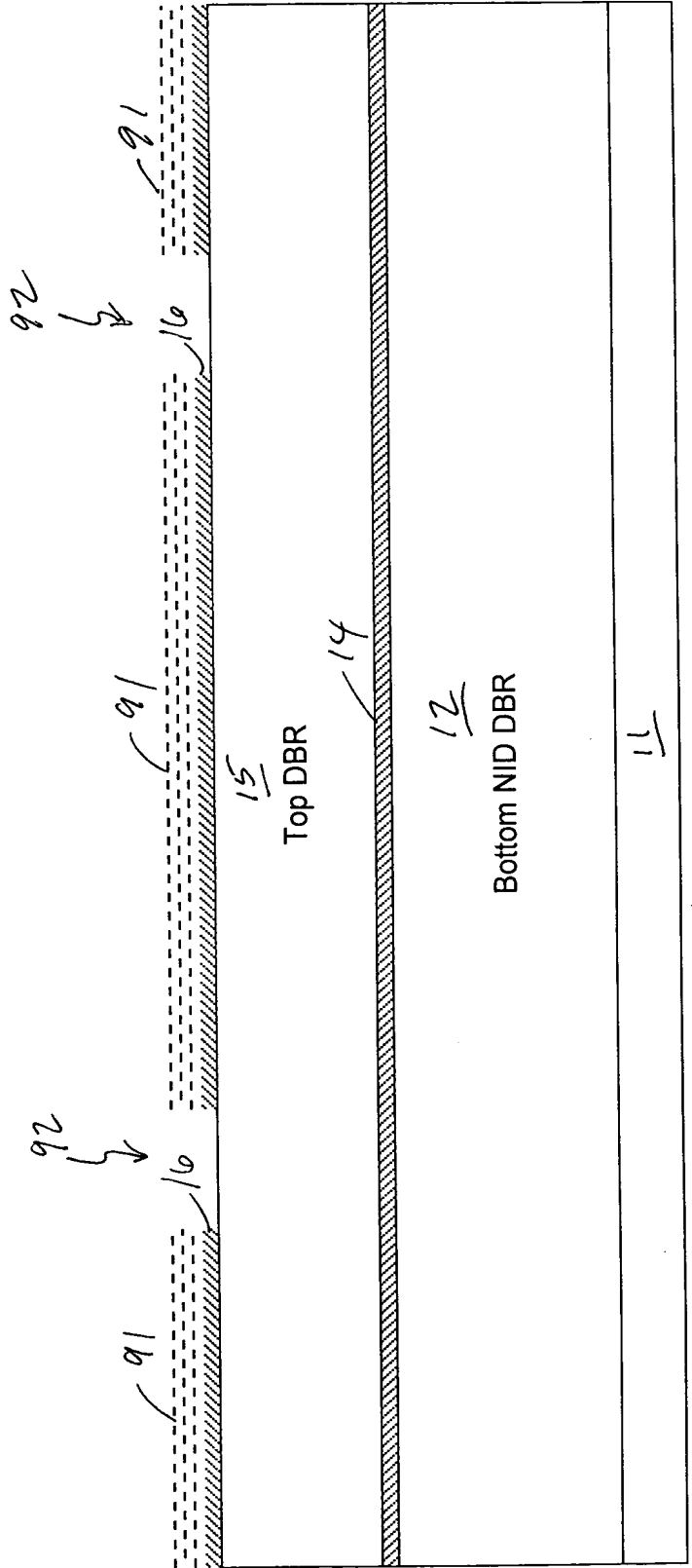


FIGURE 110

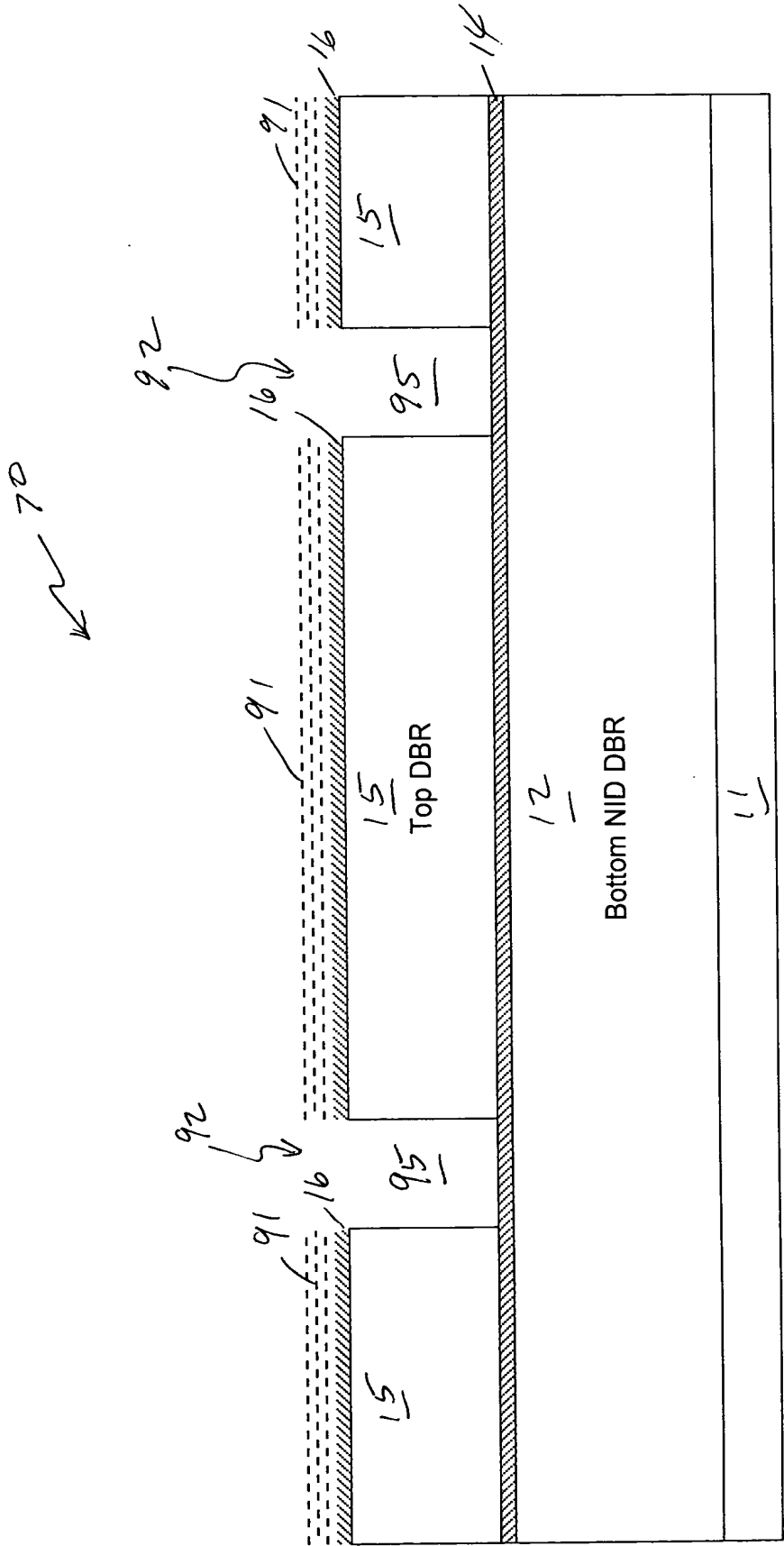


FIGURE 111

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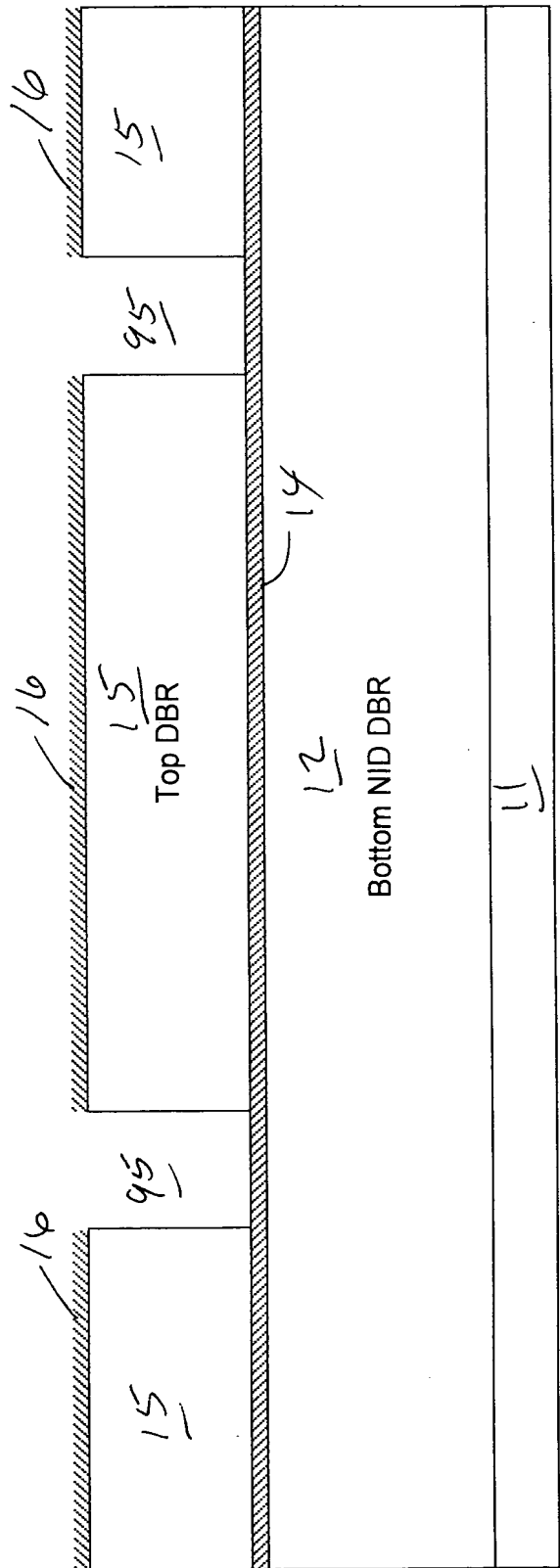


FIGURE 112

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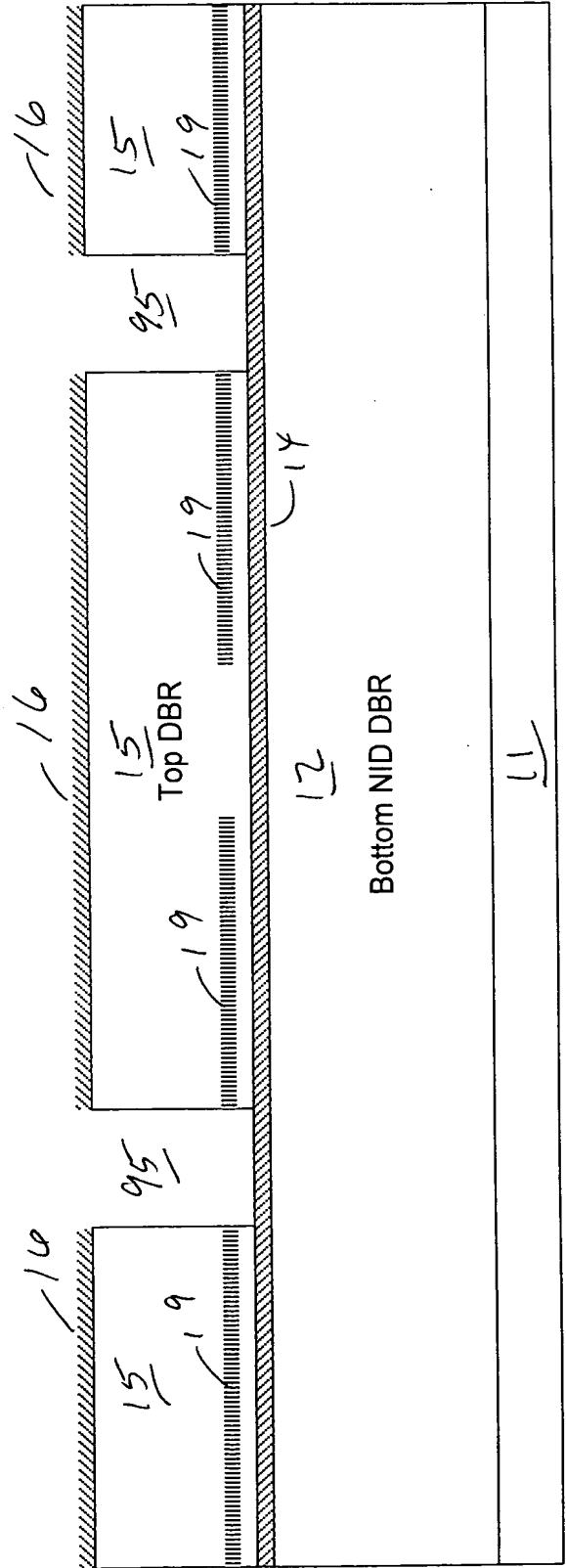
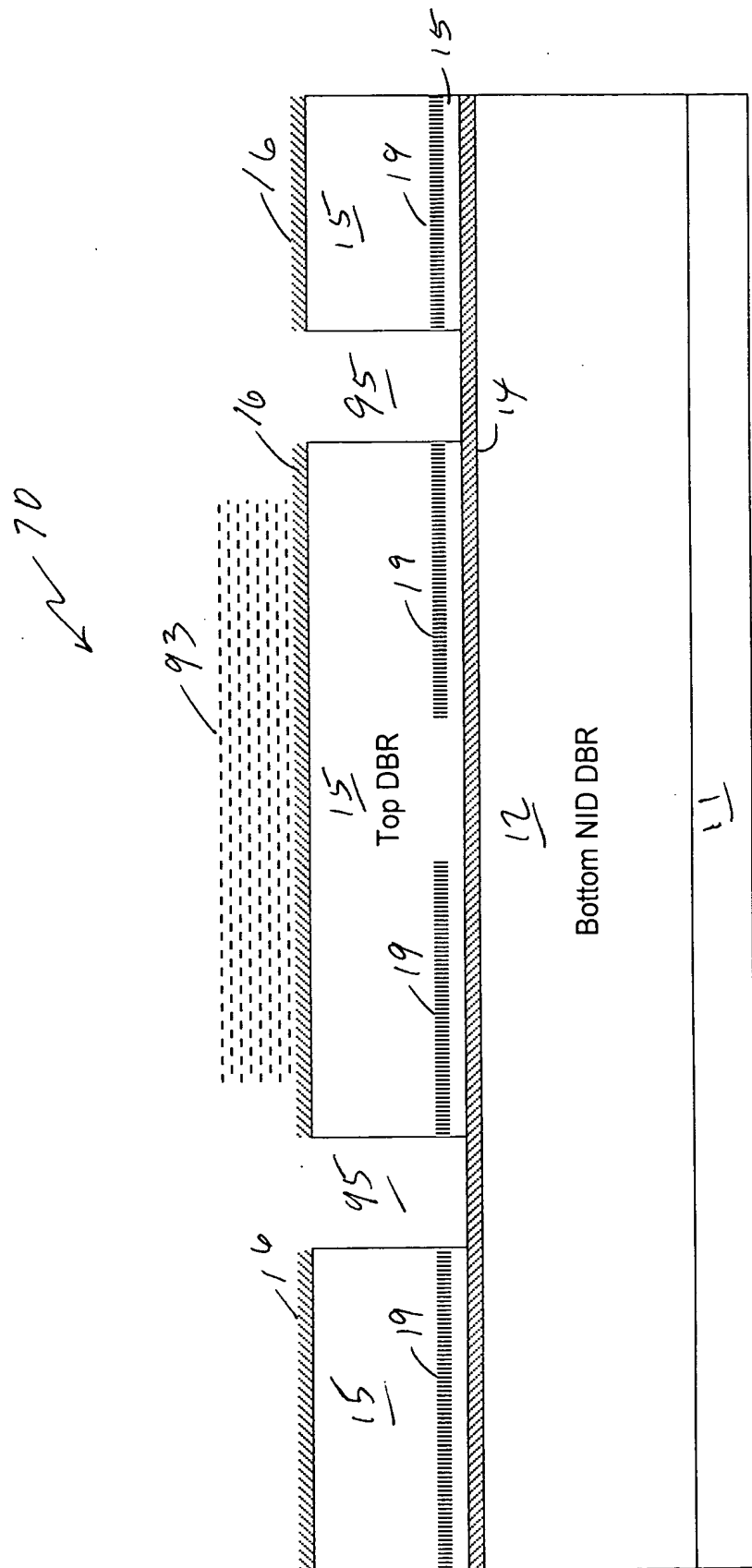


FIGURE 113



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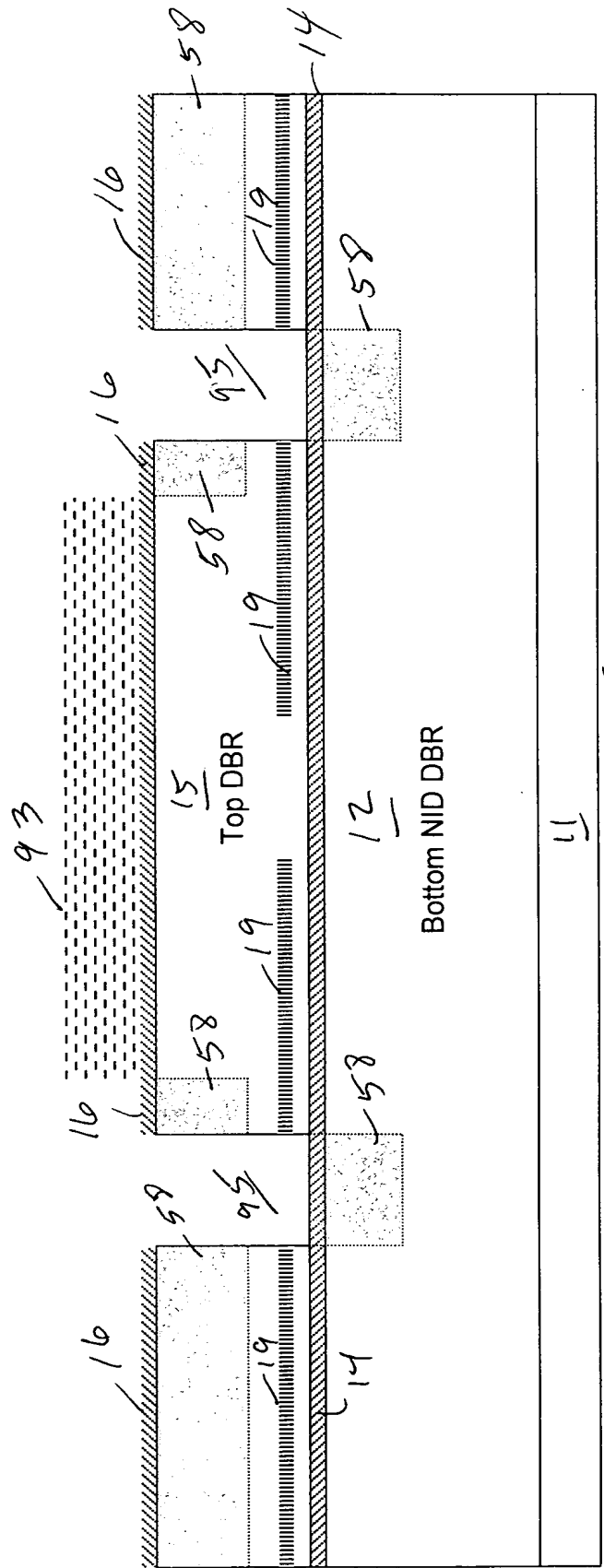


FIGURE 115

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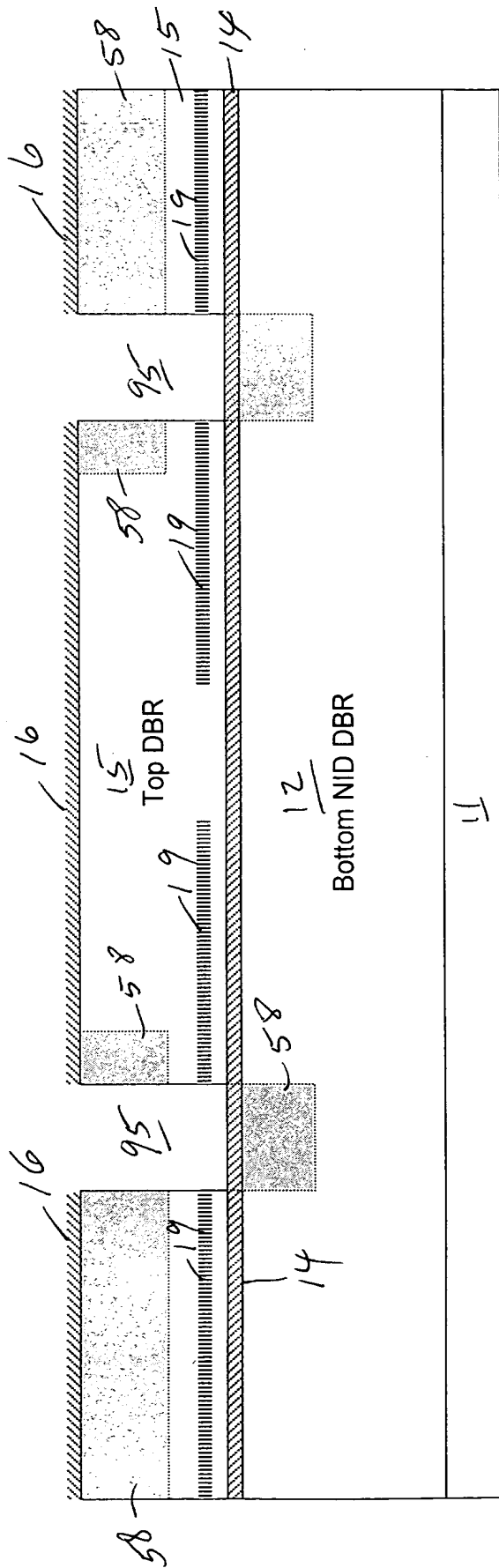
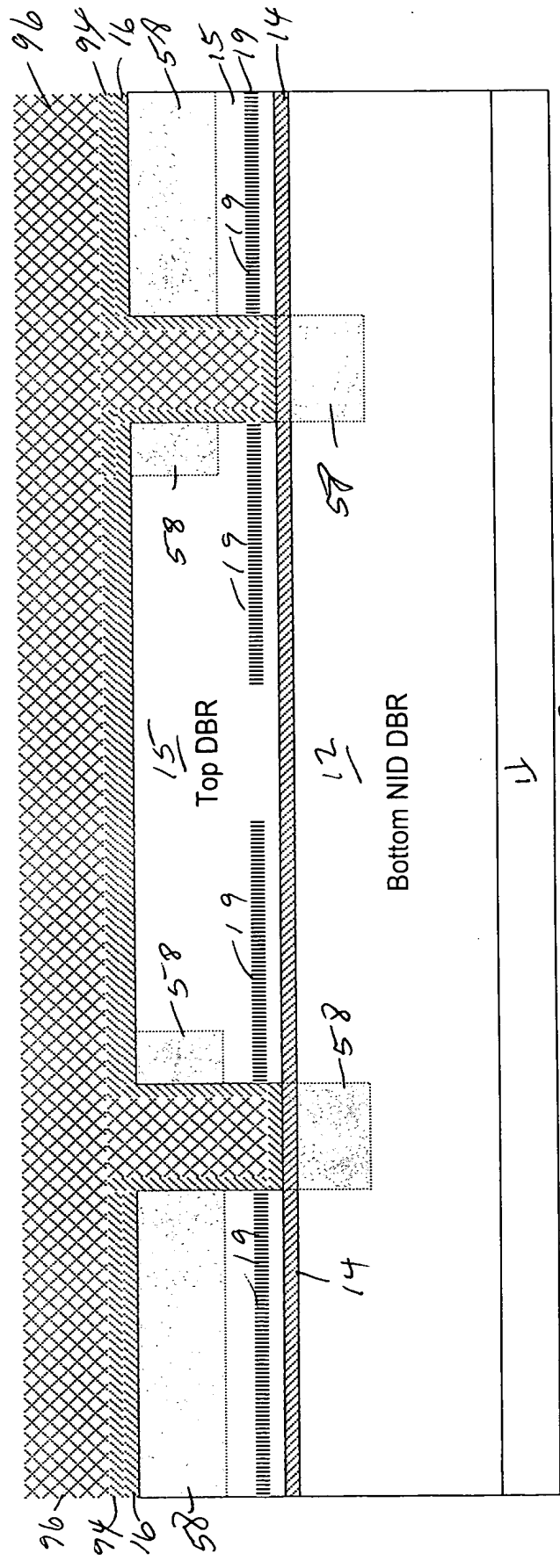


FIGURE 110

[illegible]

FIGURE 117

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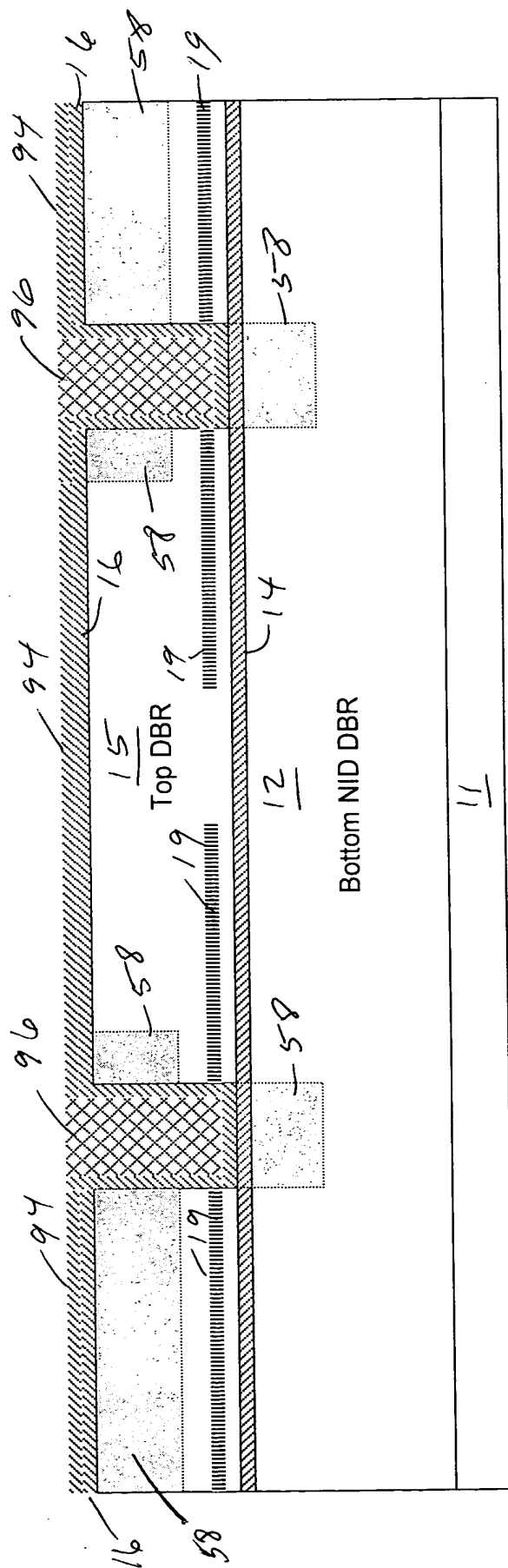


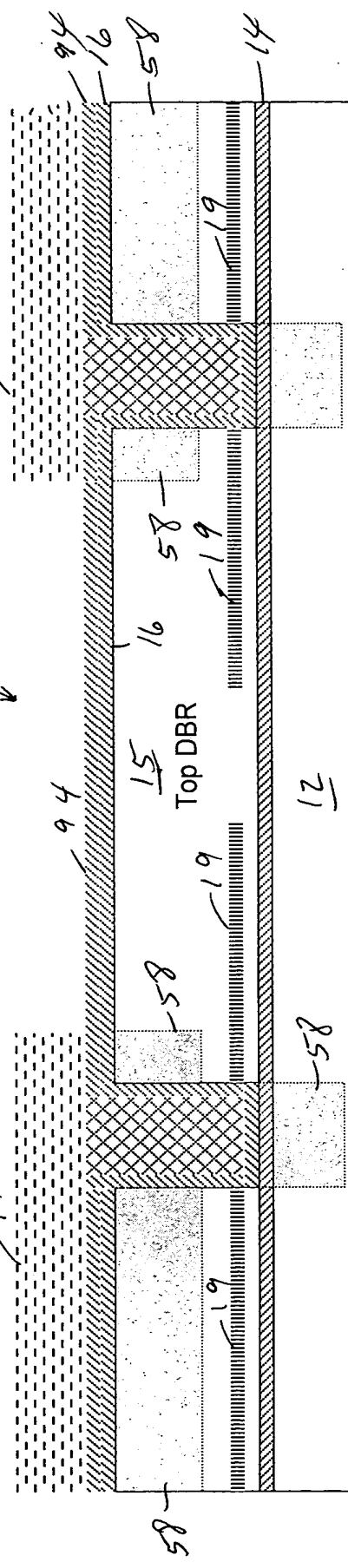
FIGURE 119

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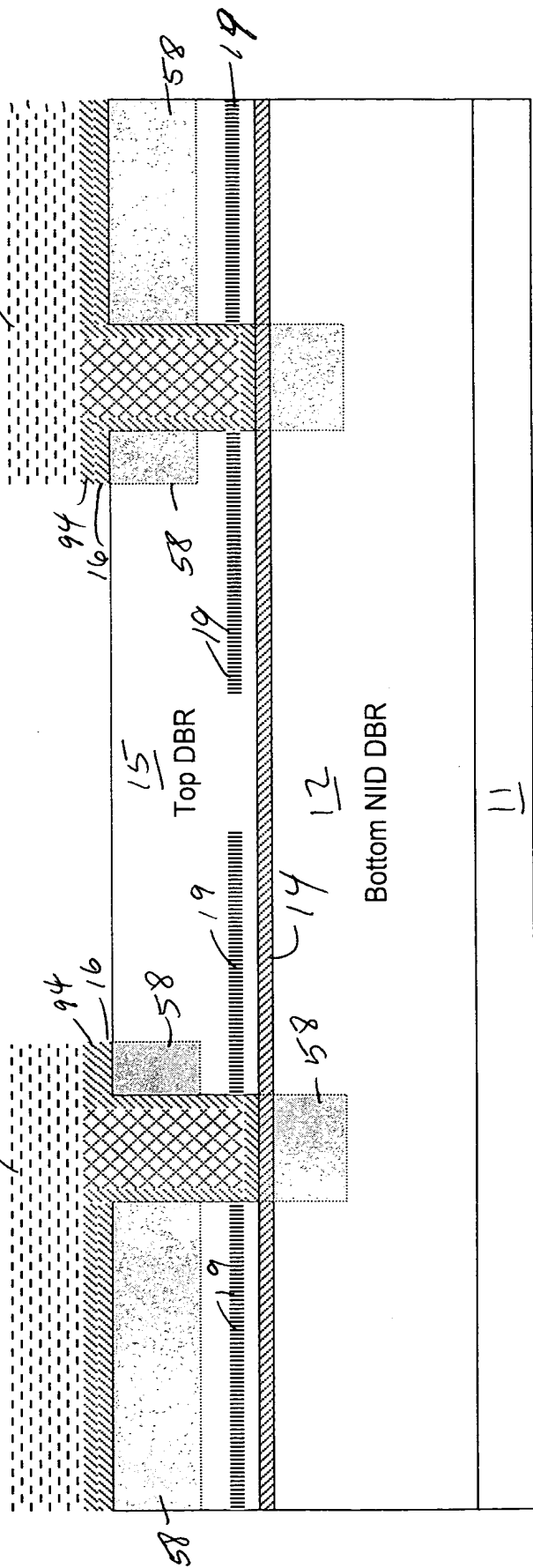
FIGURE 120

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FIGURE 121

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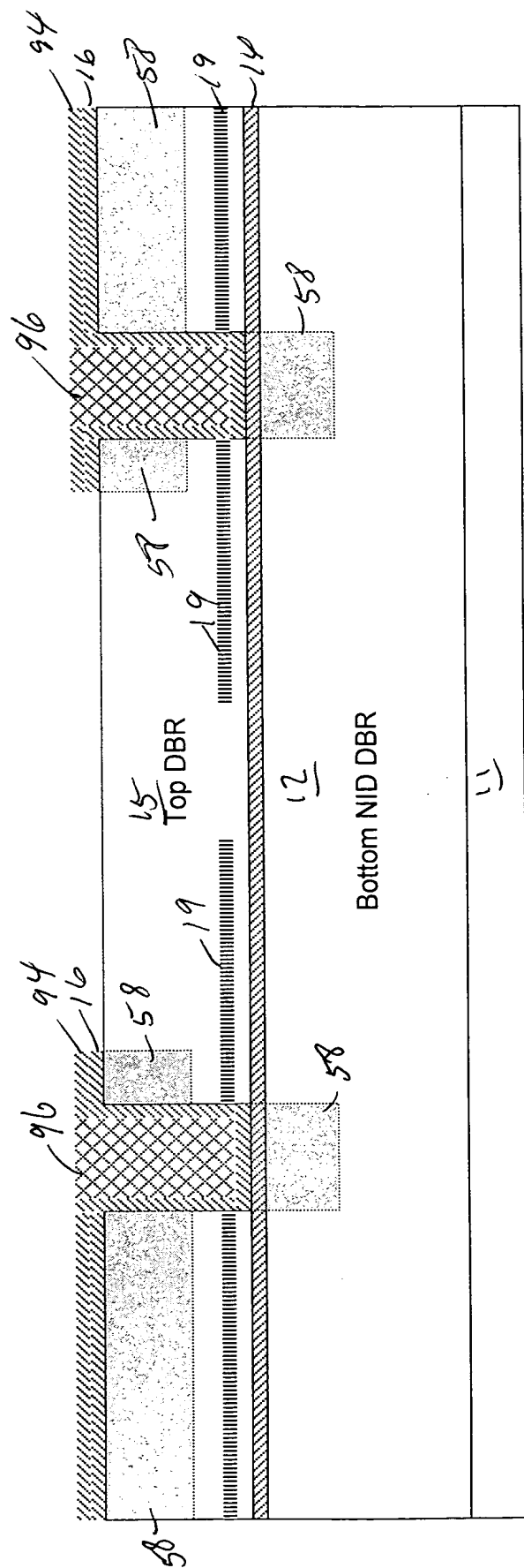


FIGURE 122

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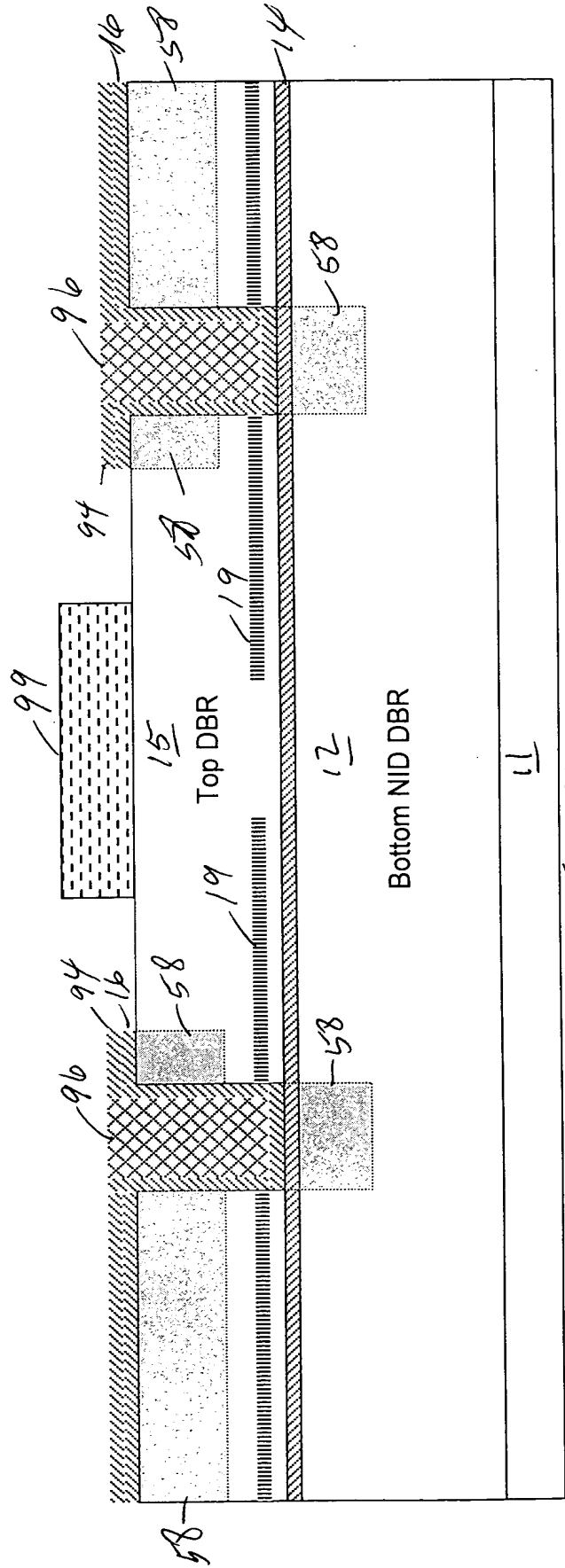


FIGURE 123

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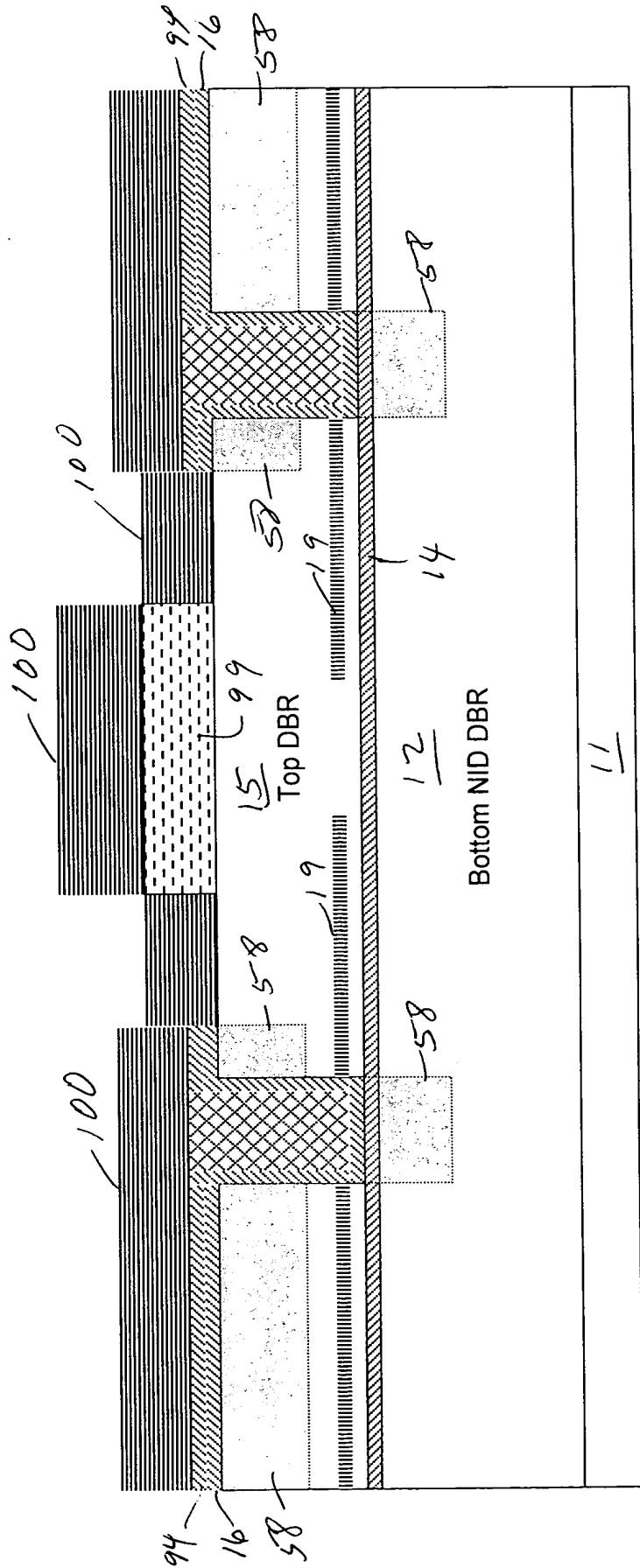


FIGURE 124

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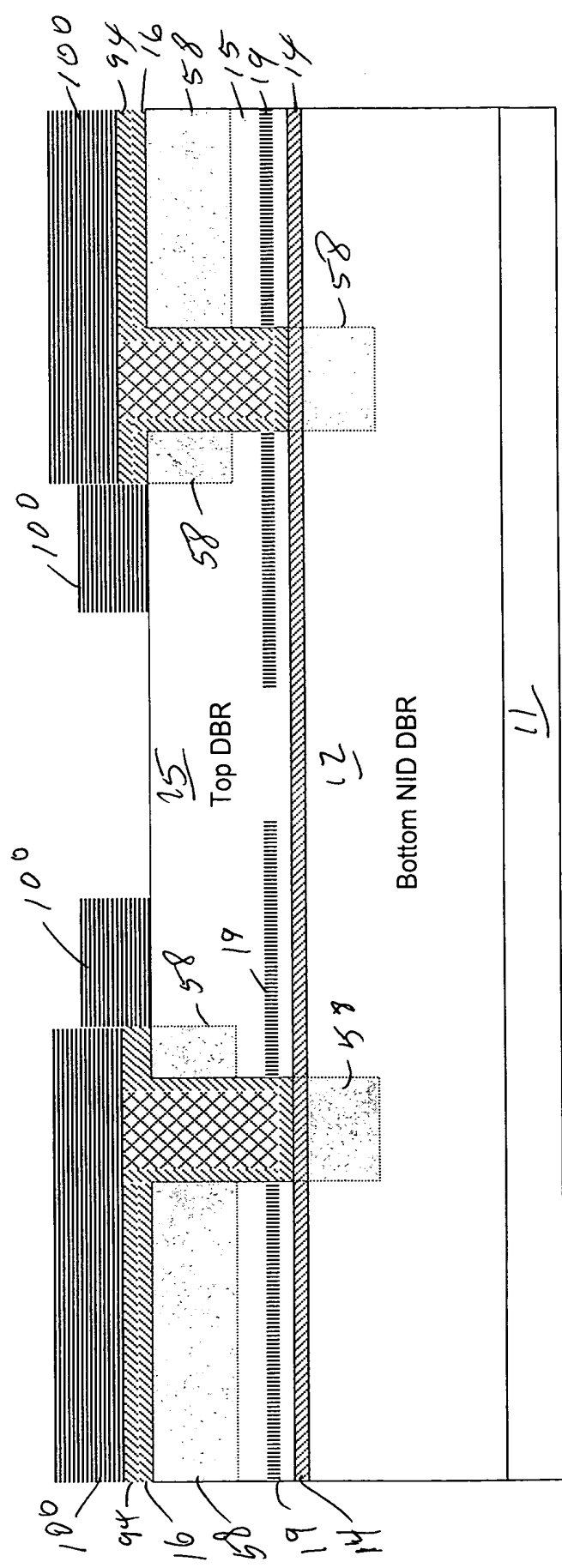


FIGURE 125

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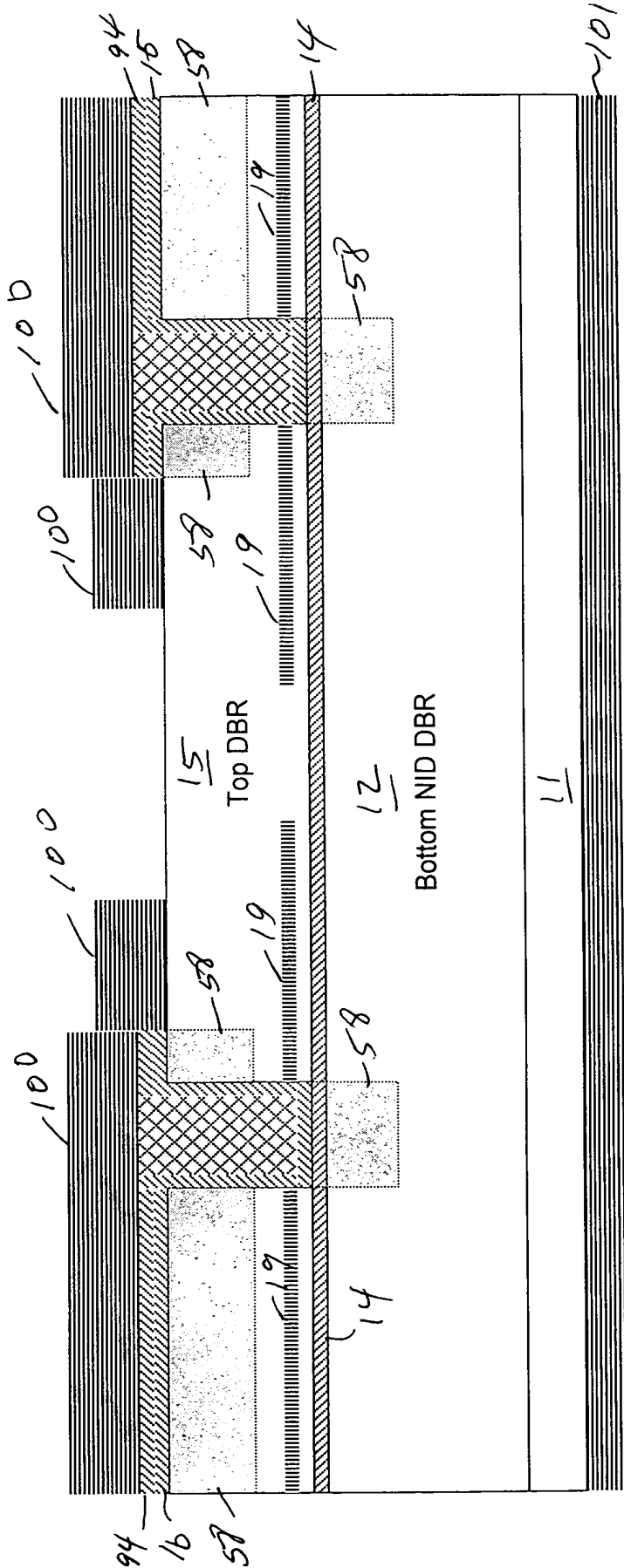


FIGURE 120

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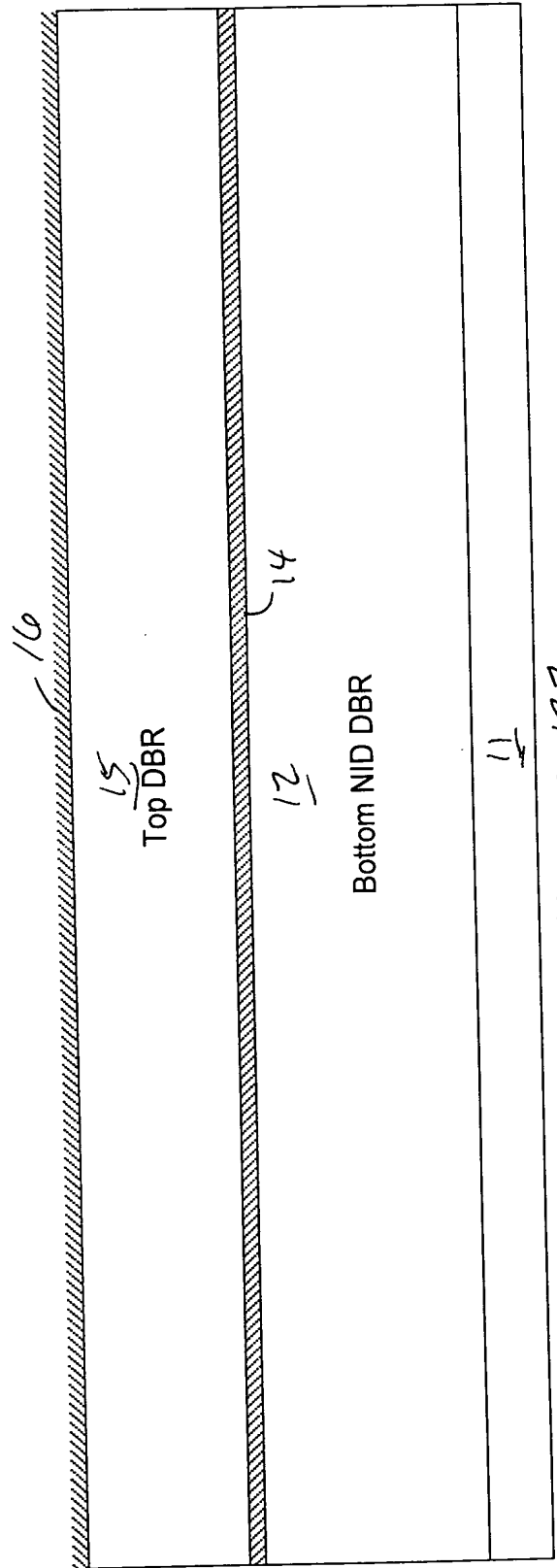


FIGURE 127

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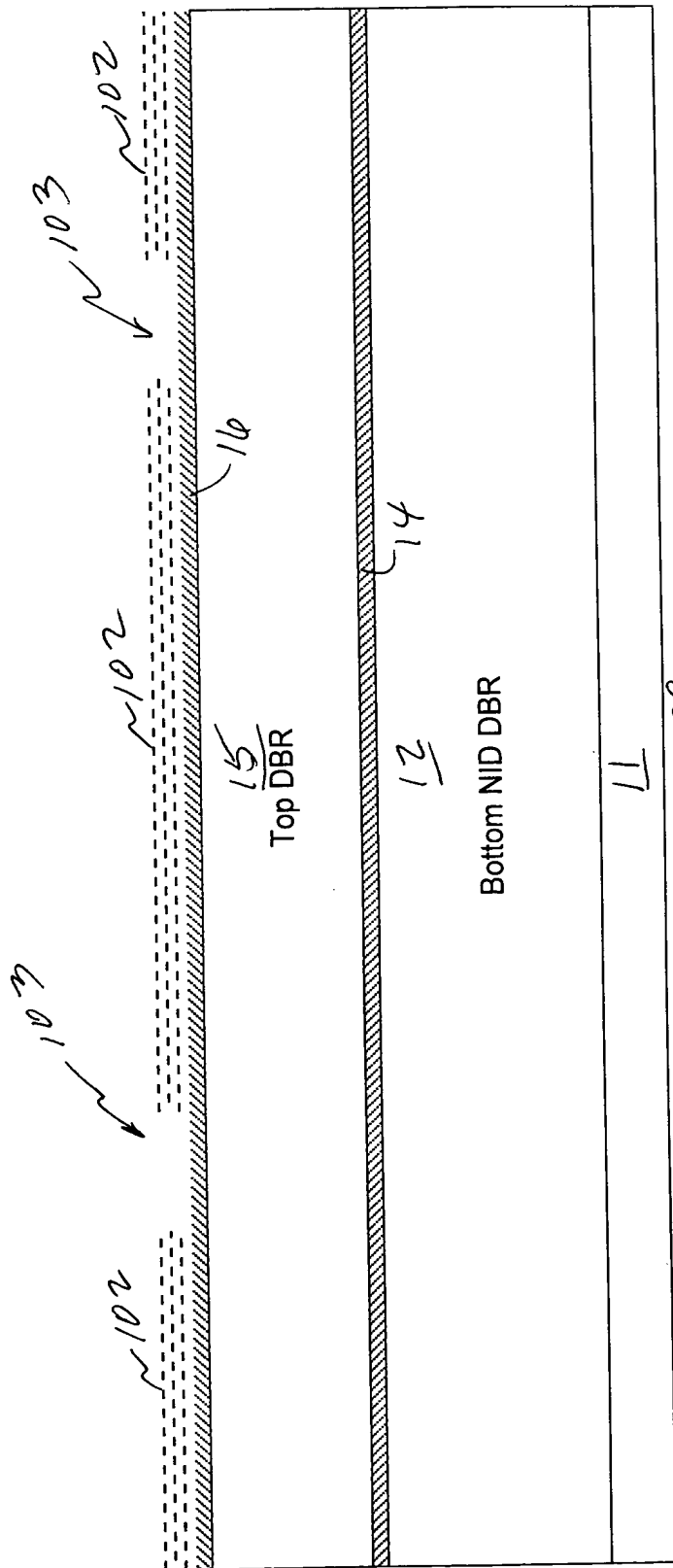


FIGURE 128

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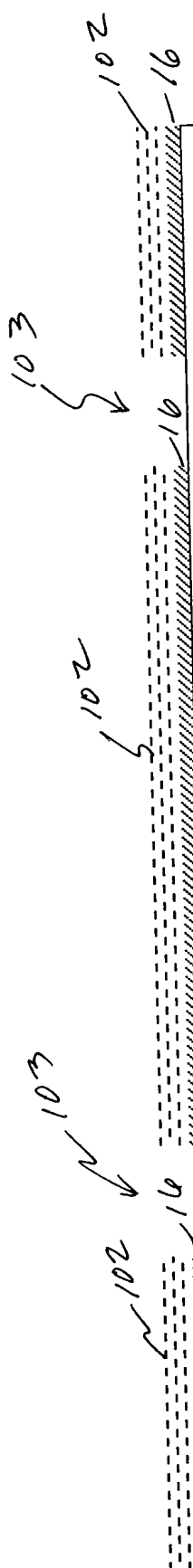


FIGURE 129

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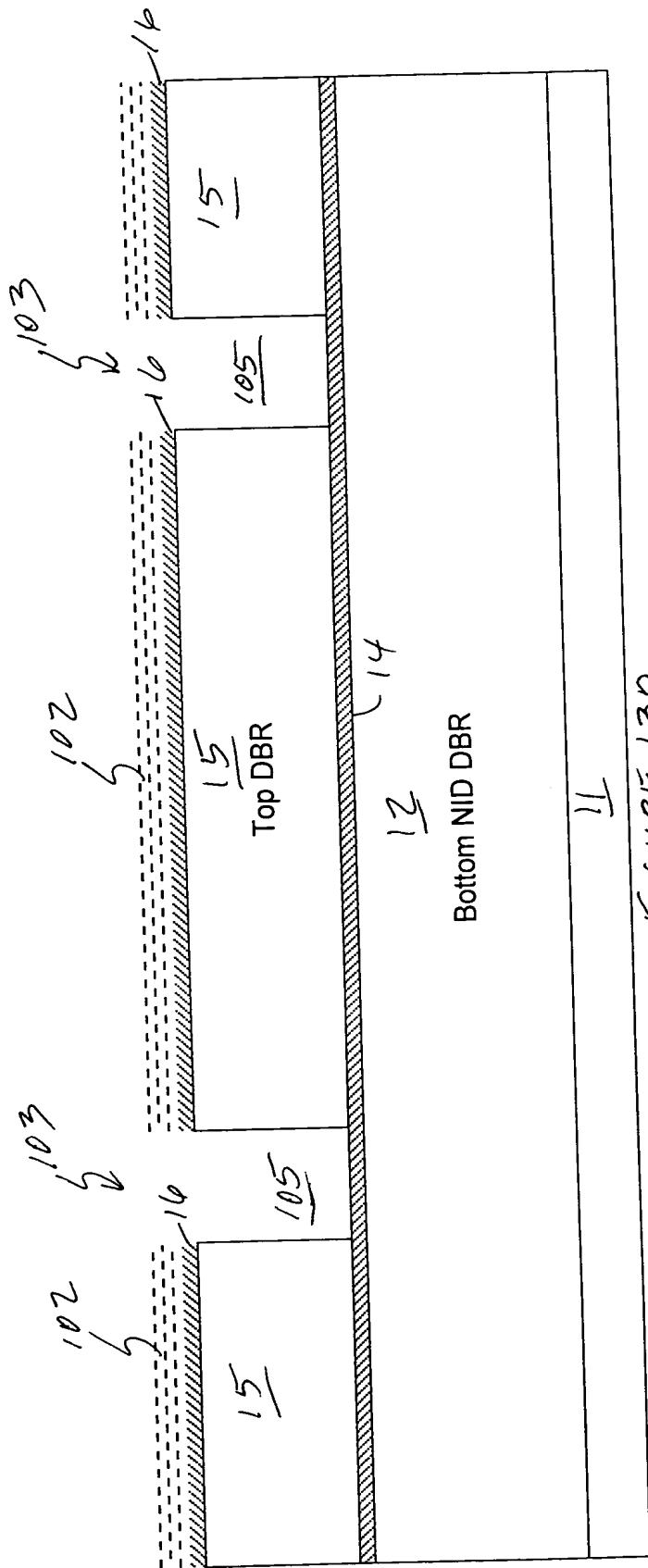


FIGURE 130

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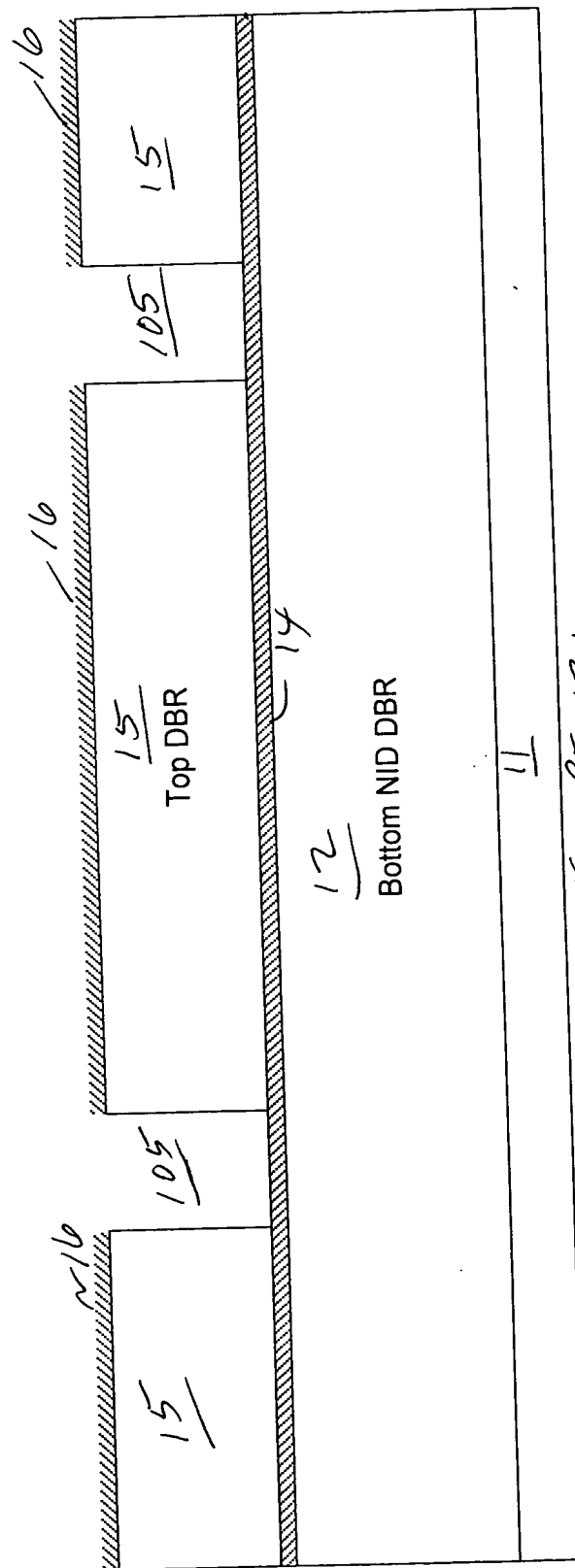


FIGURE 131

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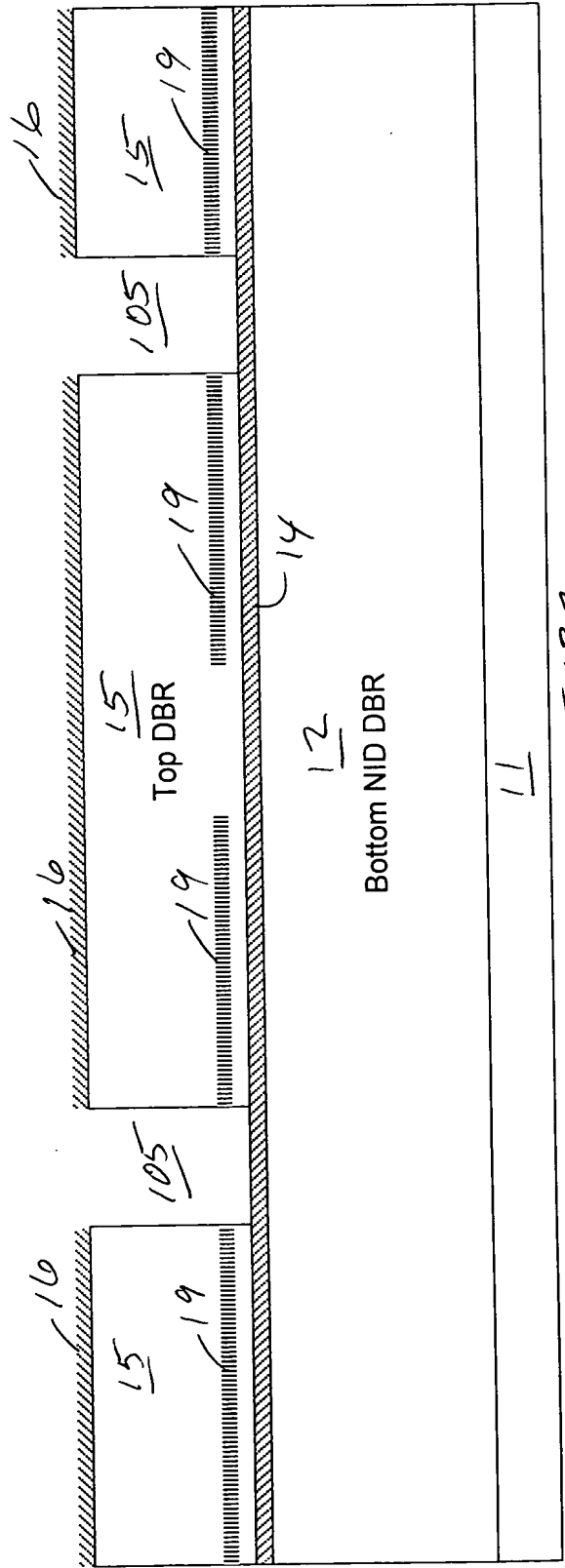


FIGURE 132

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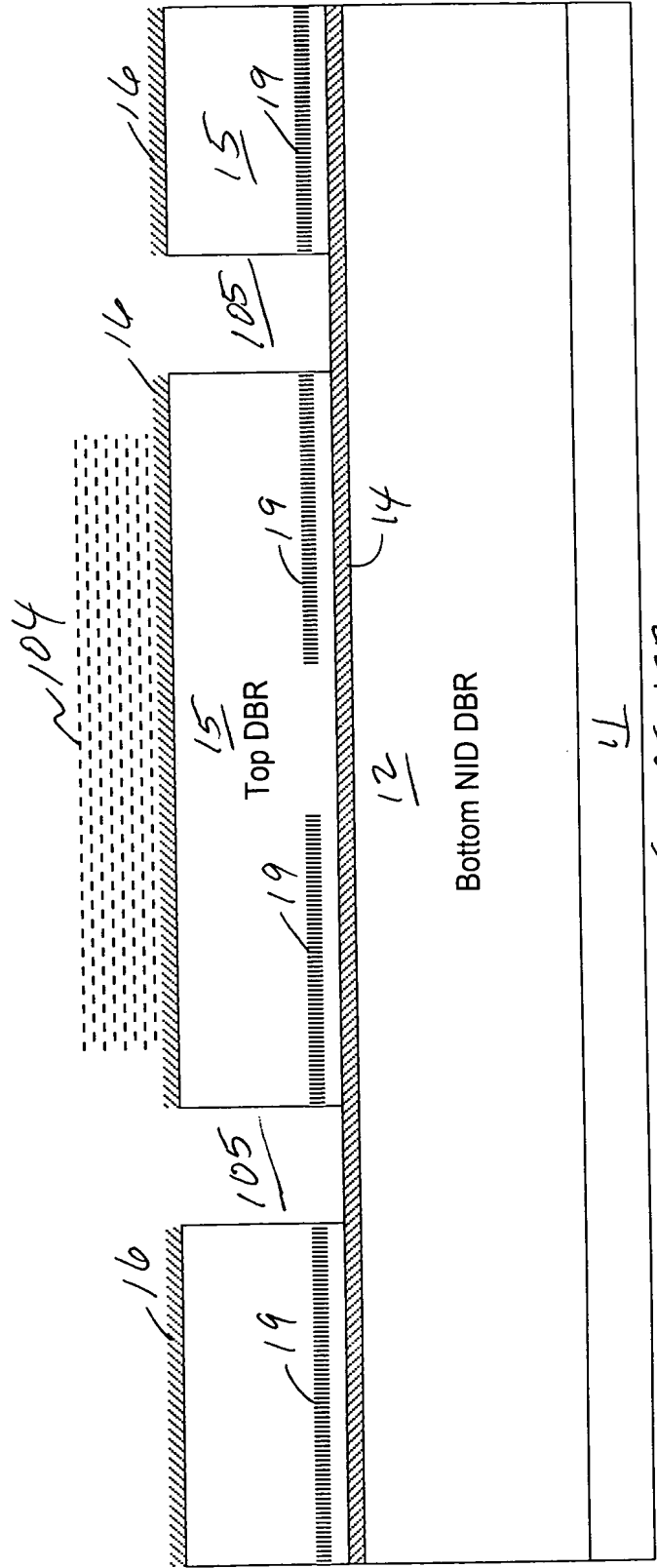
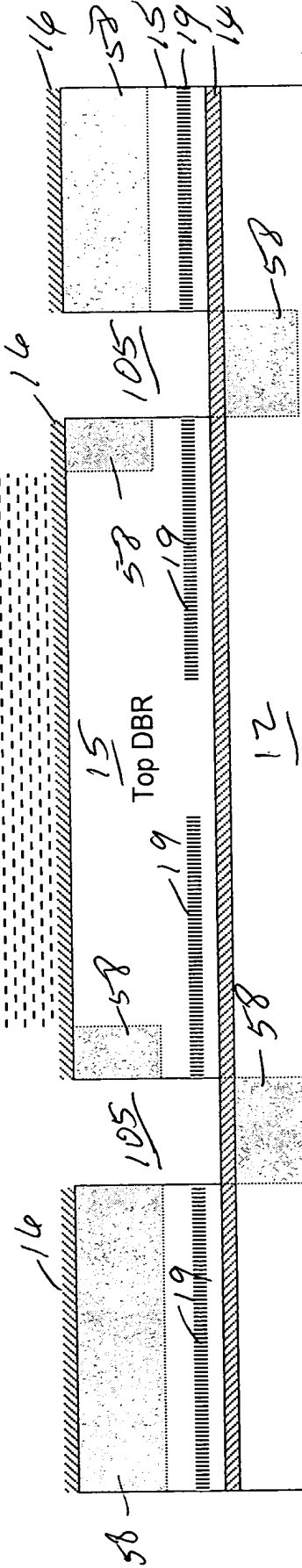


FIGURE 133

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Bottom NID DBR

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FIGURE 134

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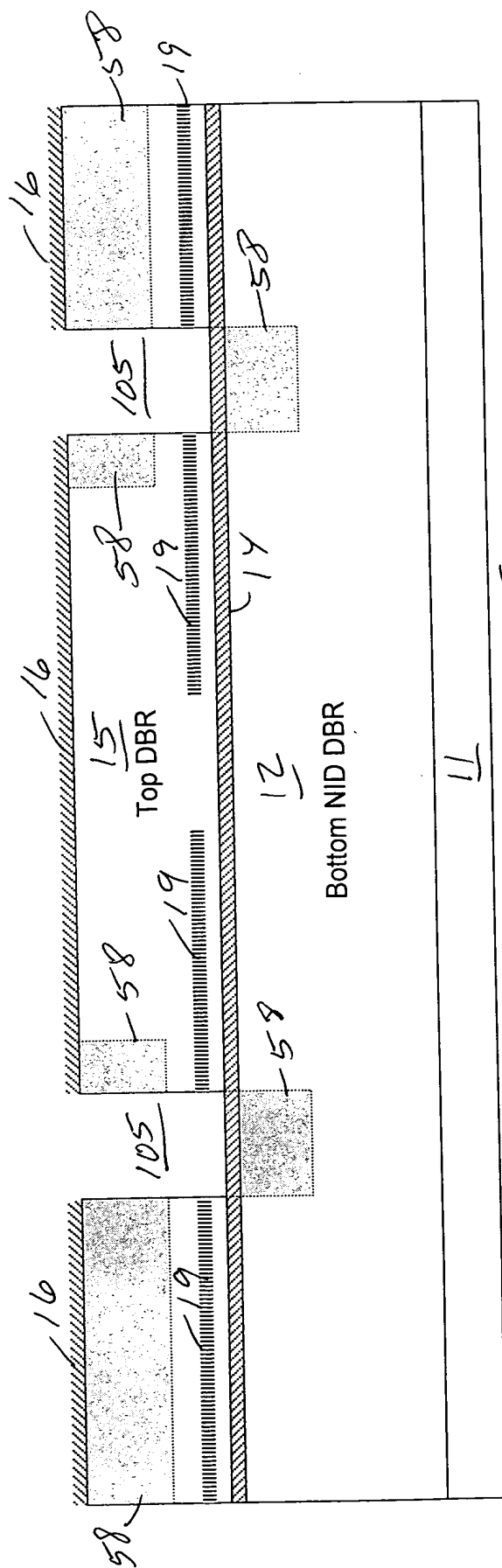


FIGURE 135

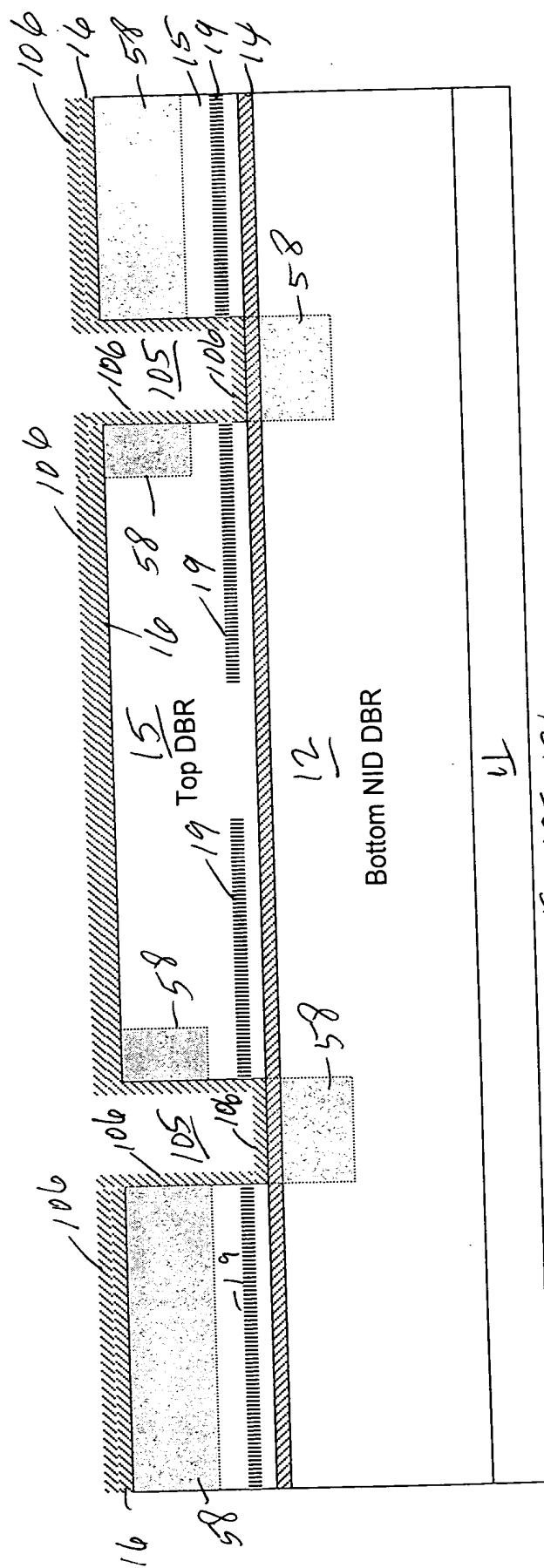


FIGURE 136

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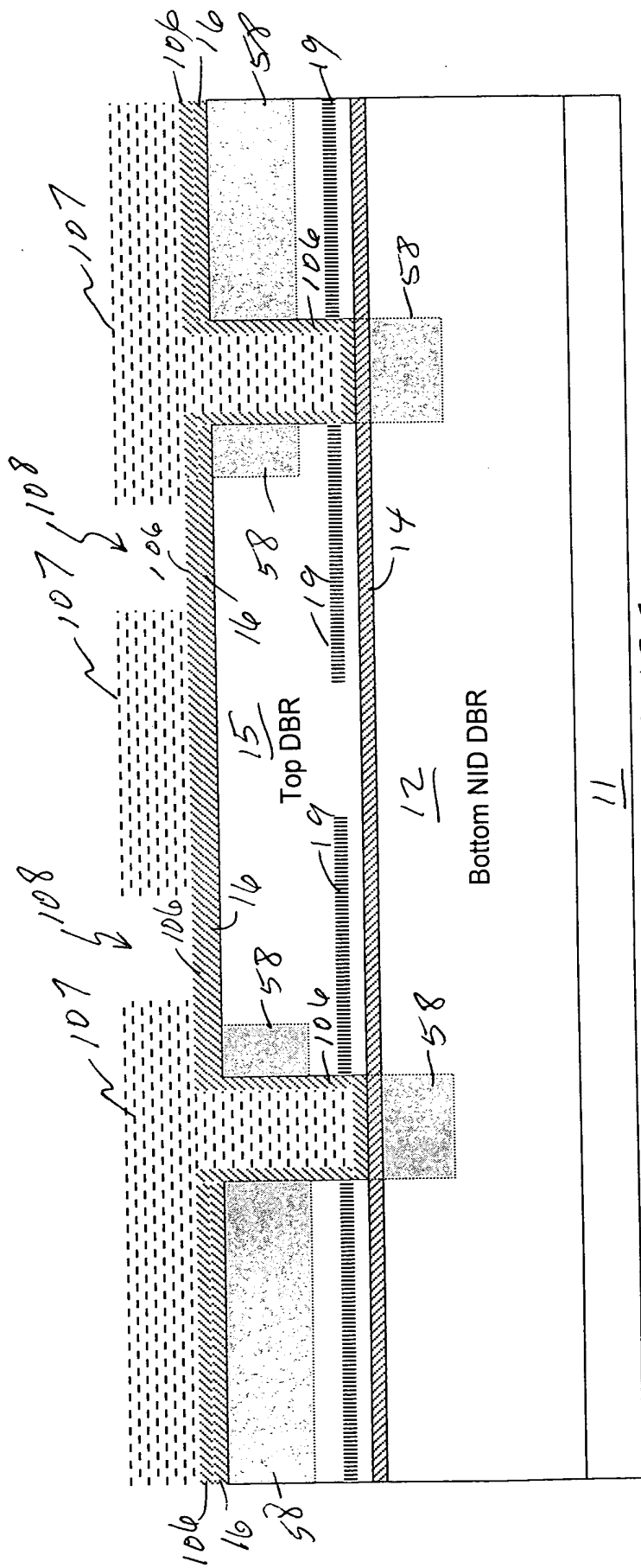


FIGURE 137

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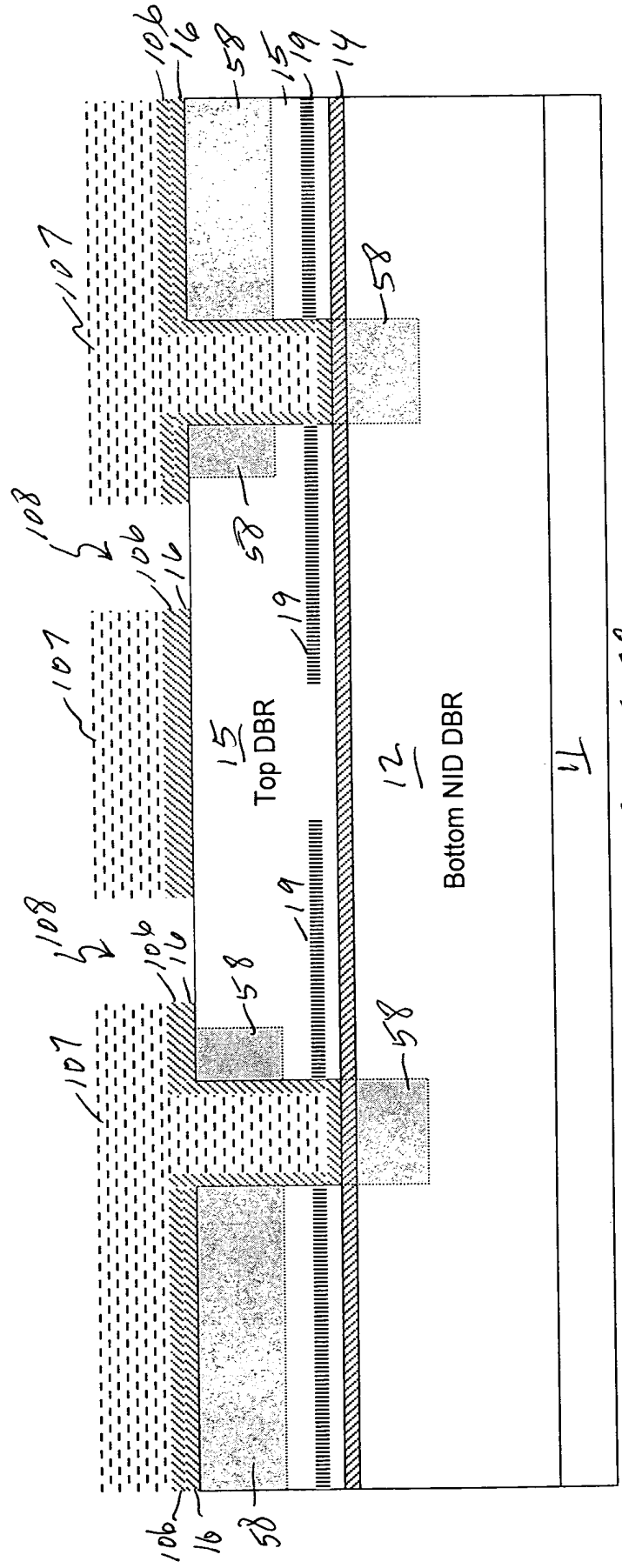
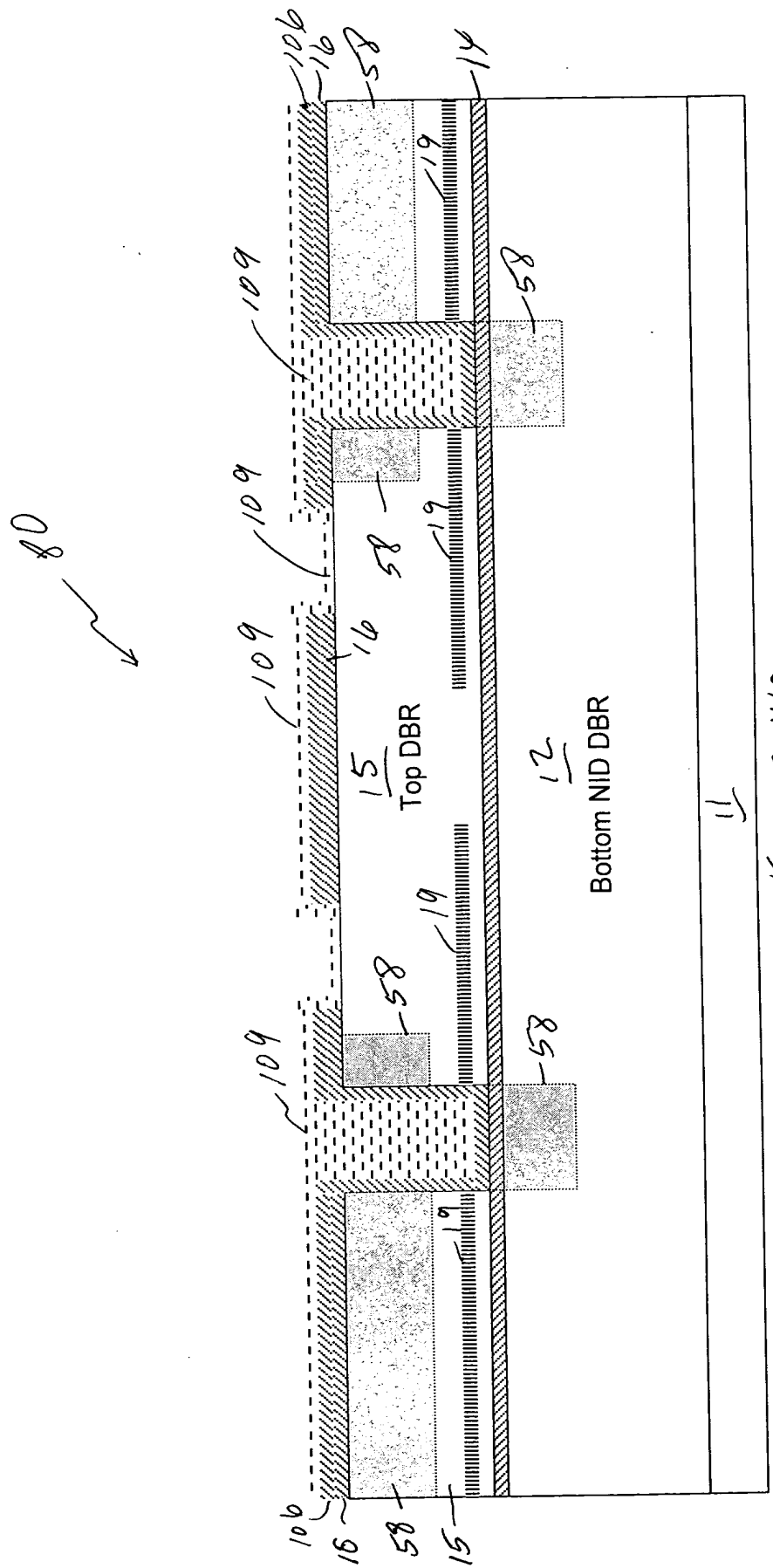


FIGURE 138

FIGURE 139



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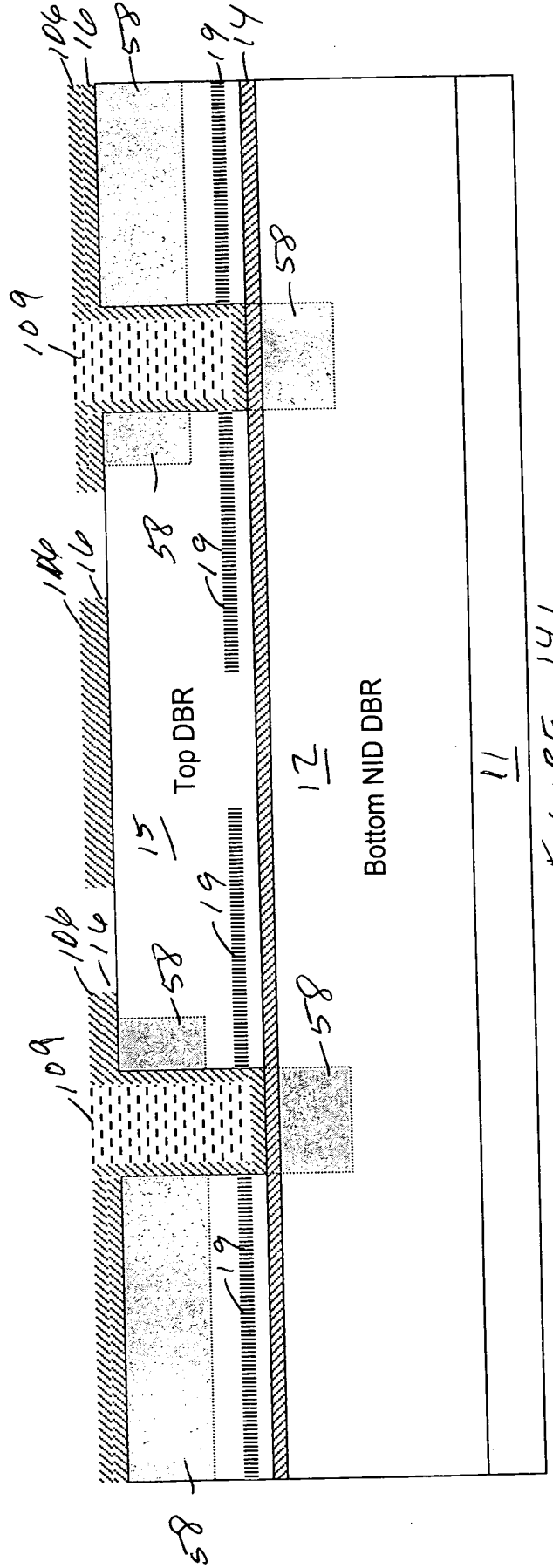


FIGURE 141

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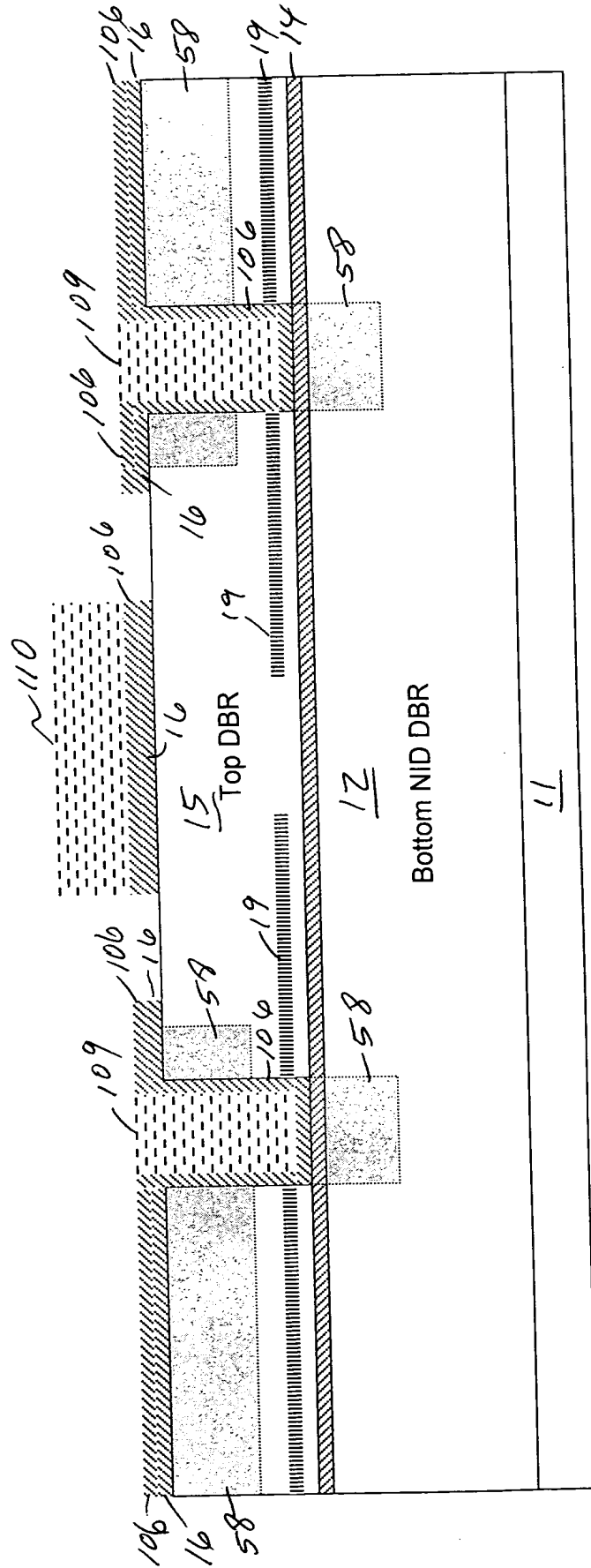


FIGURE 142

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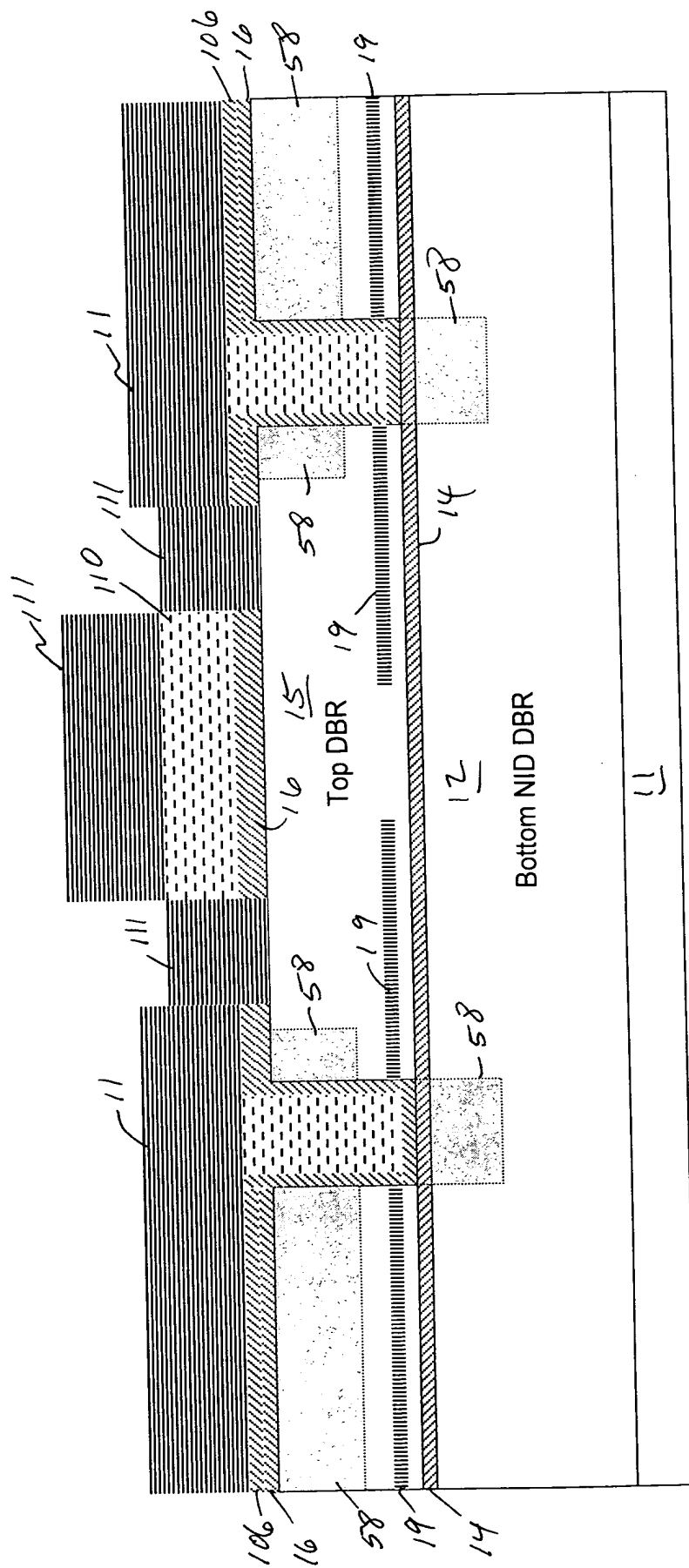


FIGURE 143

This diagram shows a cross-sectional view of a semiconductor device. It features a substrate 11 with a top DBR (Distributed Bragg Reflector) 12 and a bottom NID DBR (Normal Incidence Distributed Bragg Reflector) 14. The top DBR 12 is composed of alternating layers 105 and 106, with a total thickness of 106. The bottom NID DBR 14 is composed of alternating layers 105 and 106, with a total thickness of 106. The device also includes a central layer 111 and a bottom layer 114. Various other layers and regions are labeled with numbers 105, 106, 111, 114, 115, 119, 14, 58, and 85.

Figure 144

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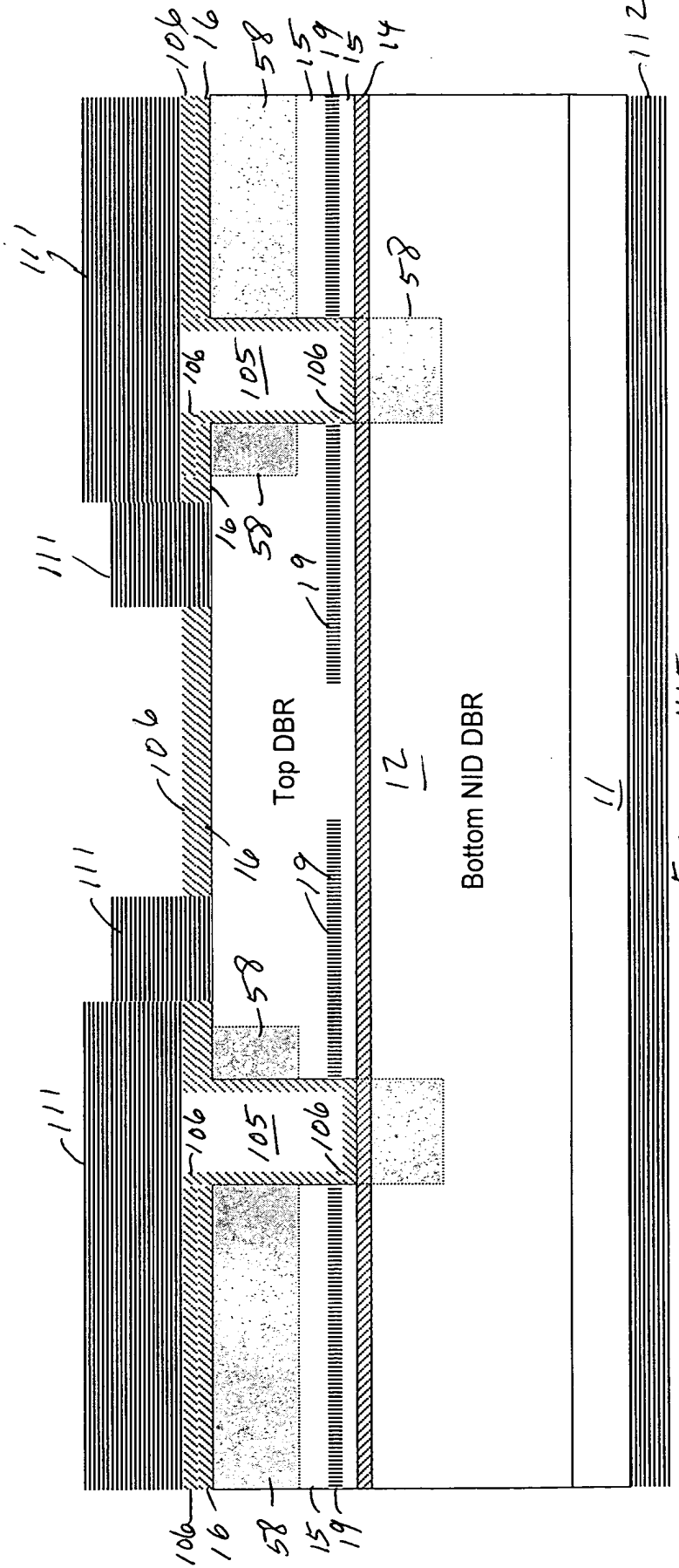


FIGURE 145

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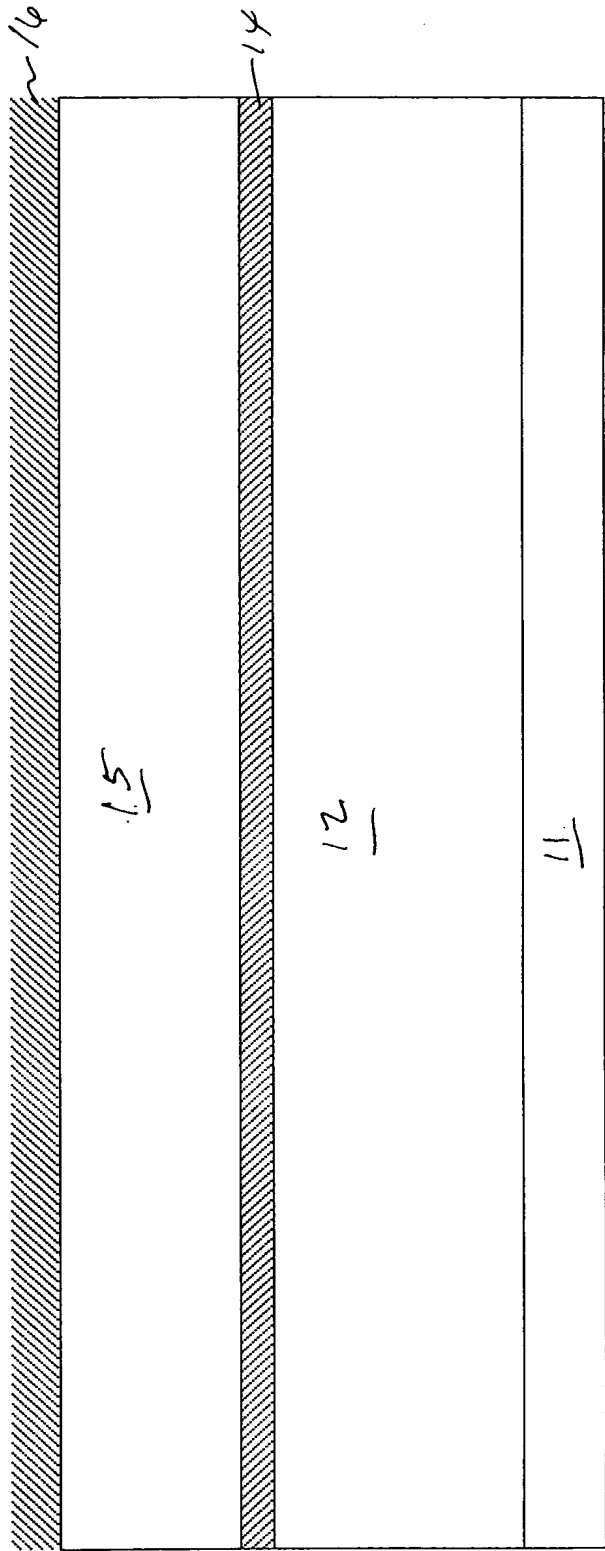


FIGURE 146

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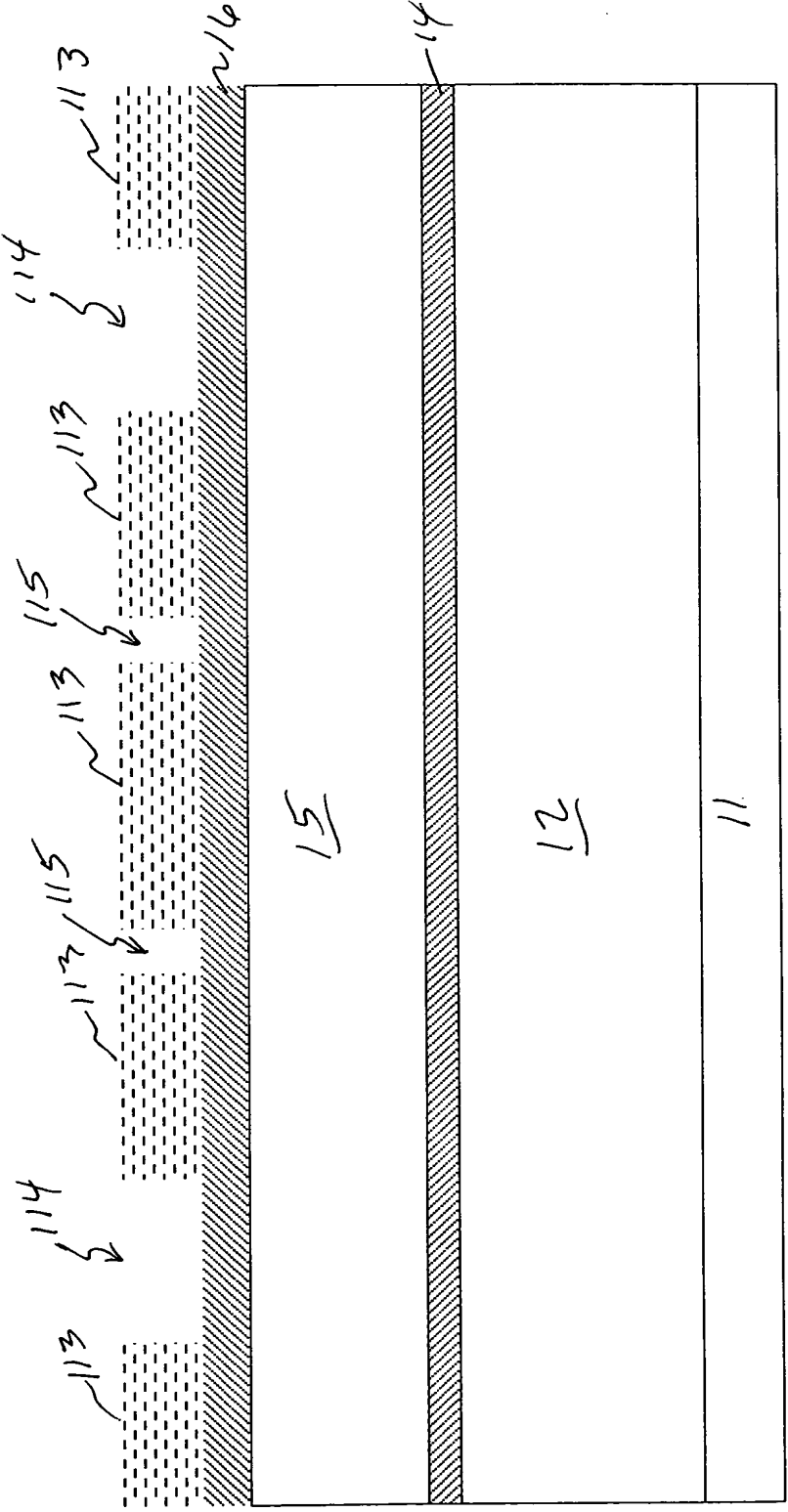


FIGURE 147

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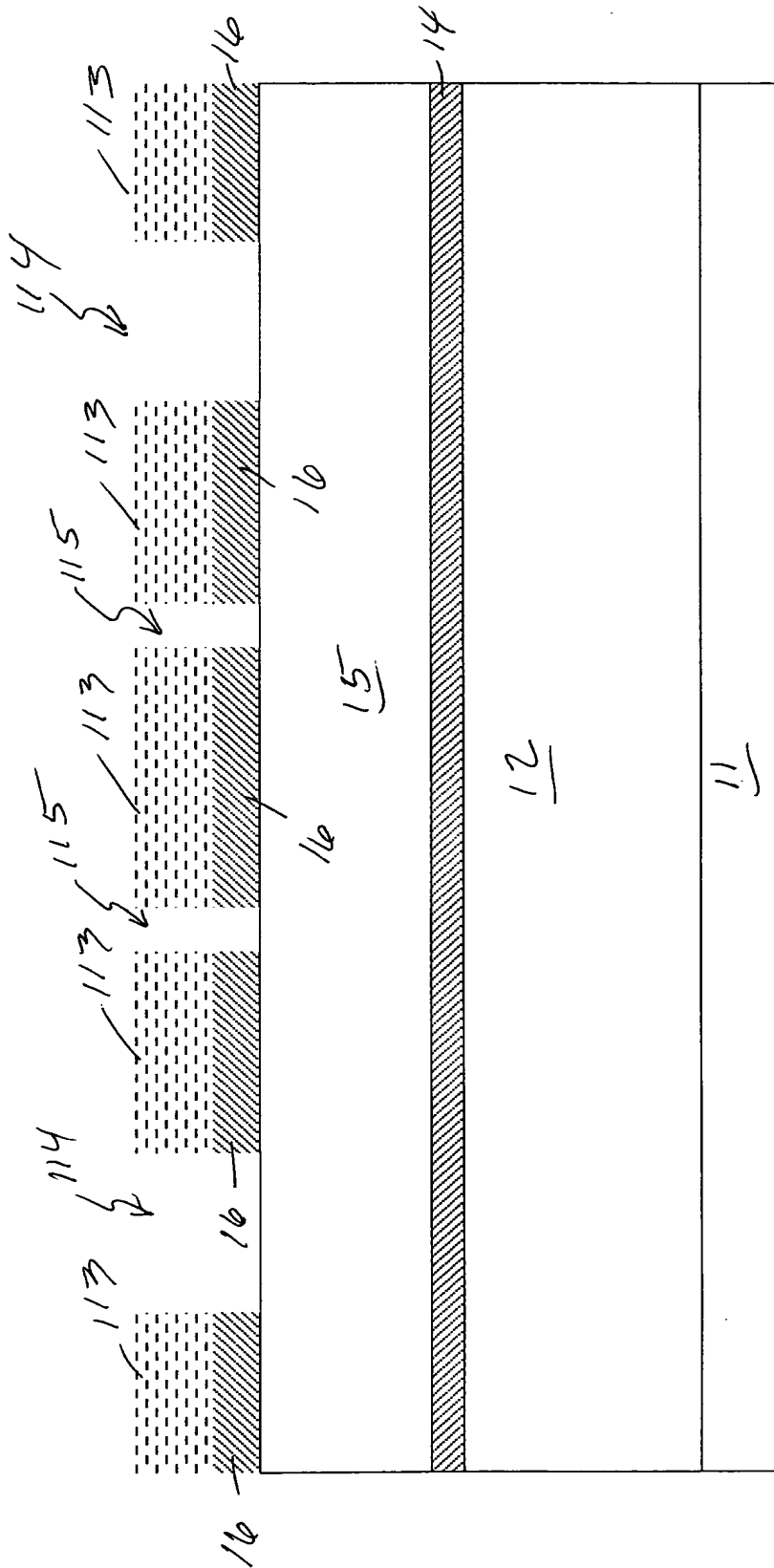
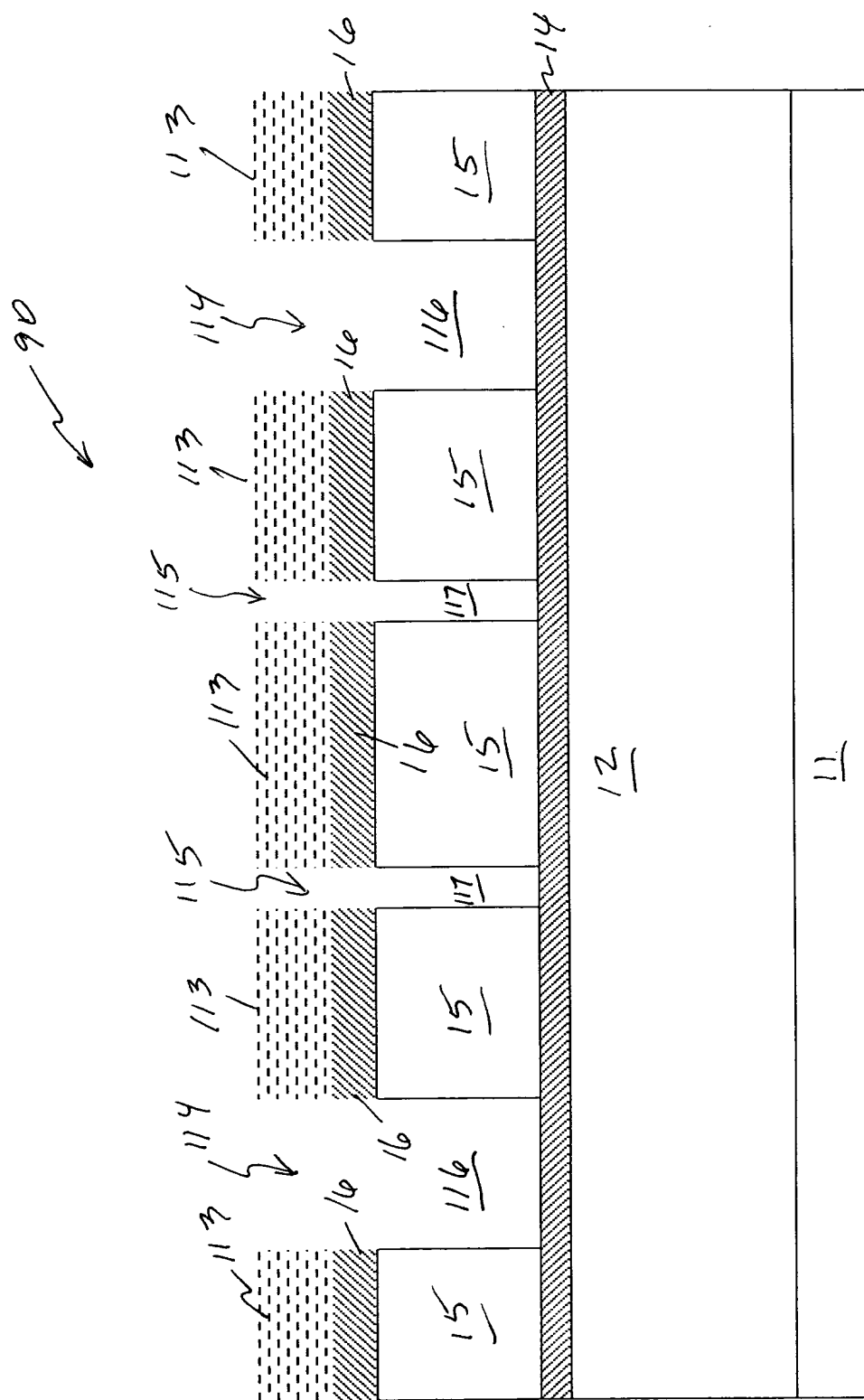


FIGURE 148



90° ↘

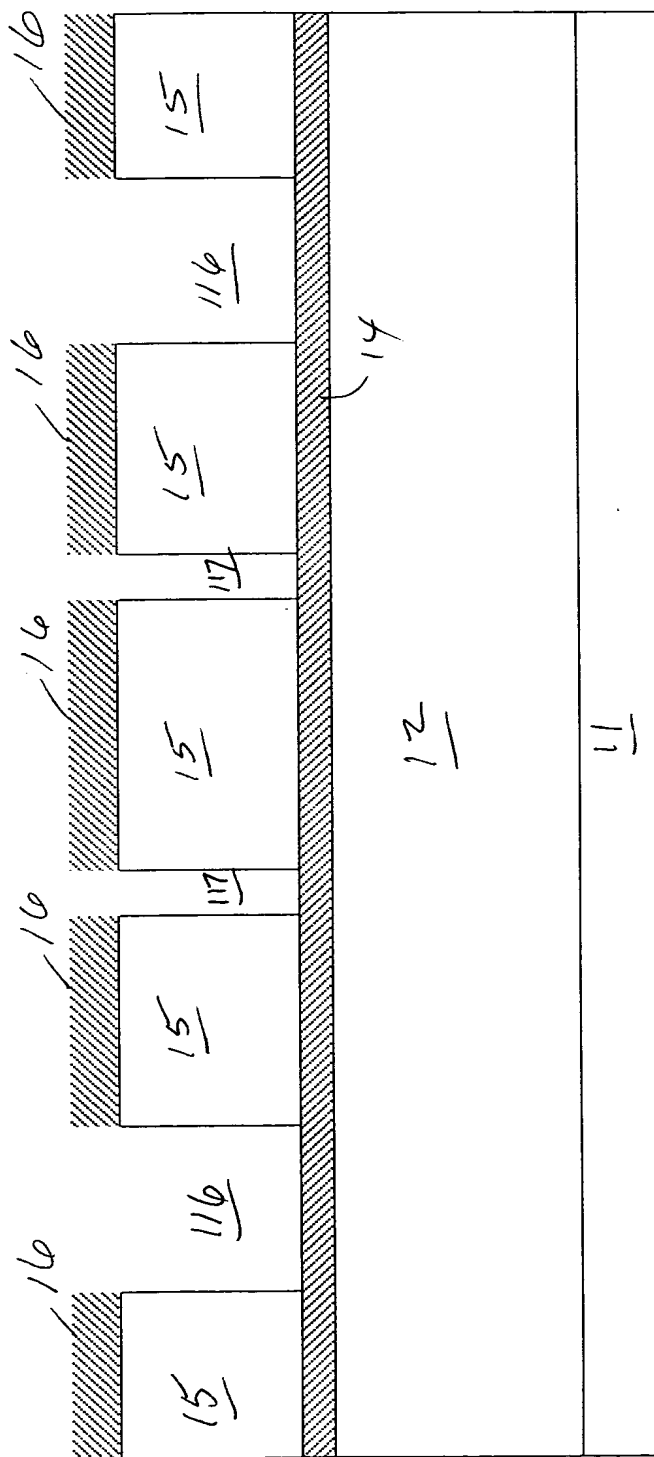


FIGURE 150

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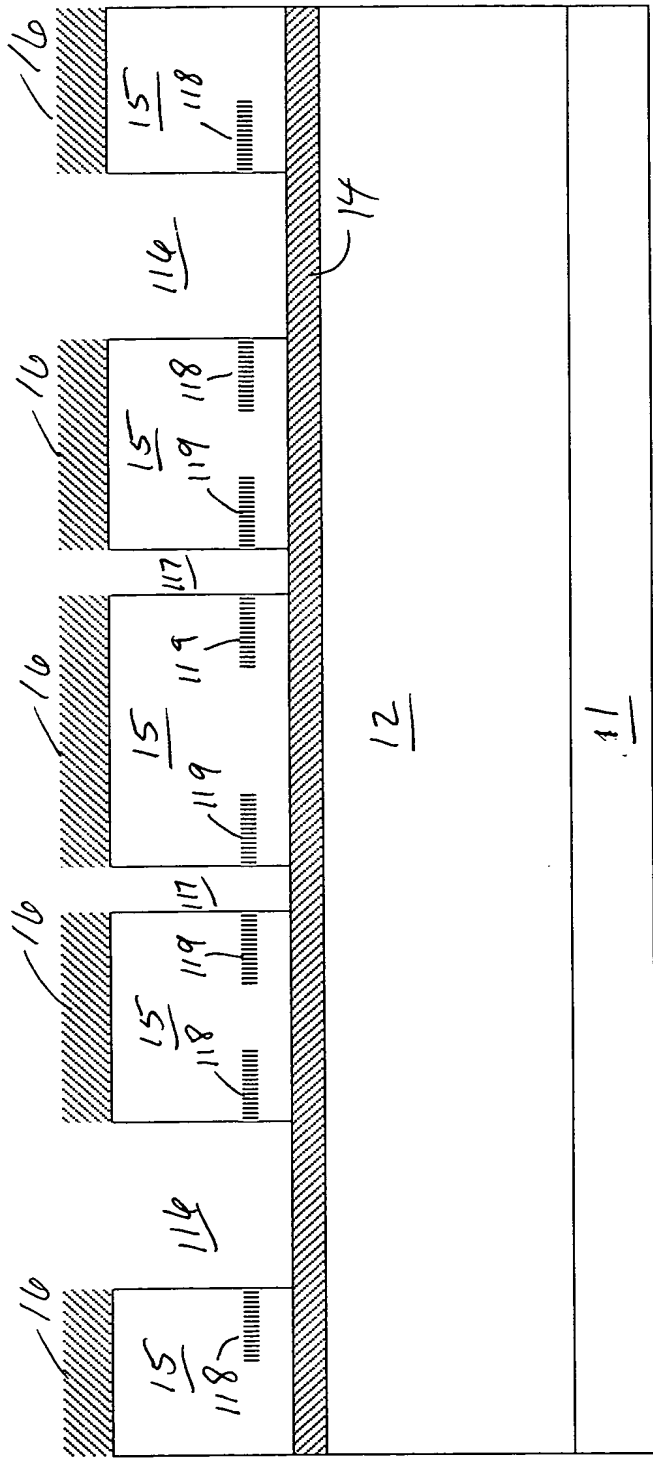


FIGURE 151

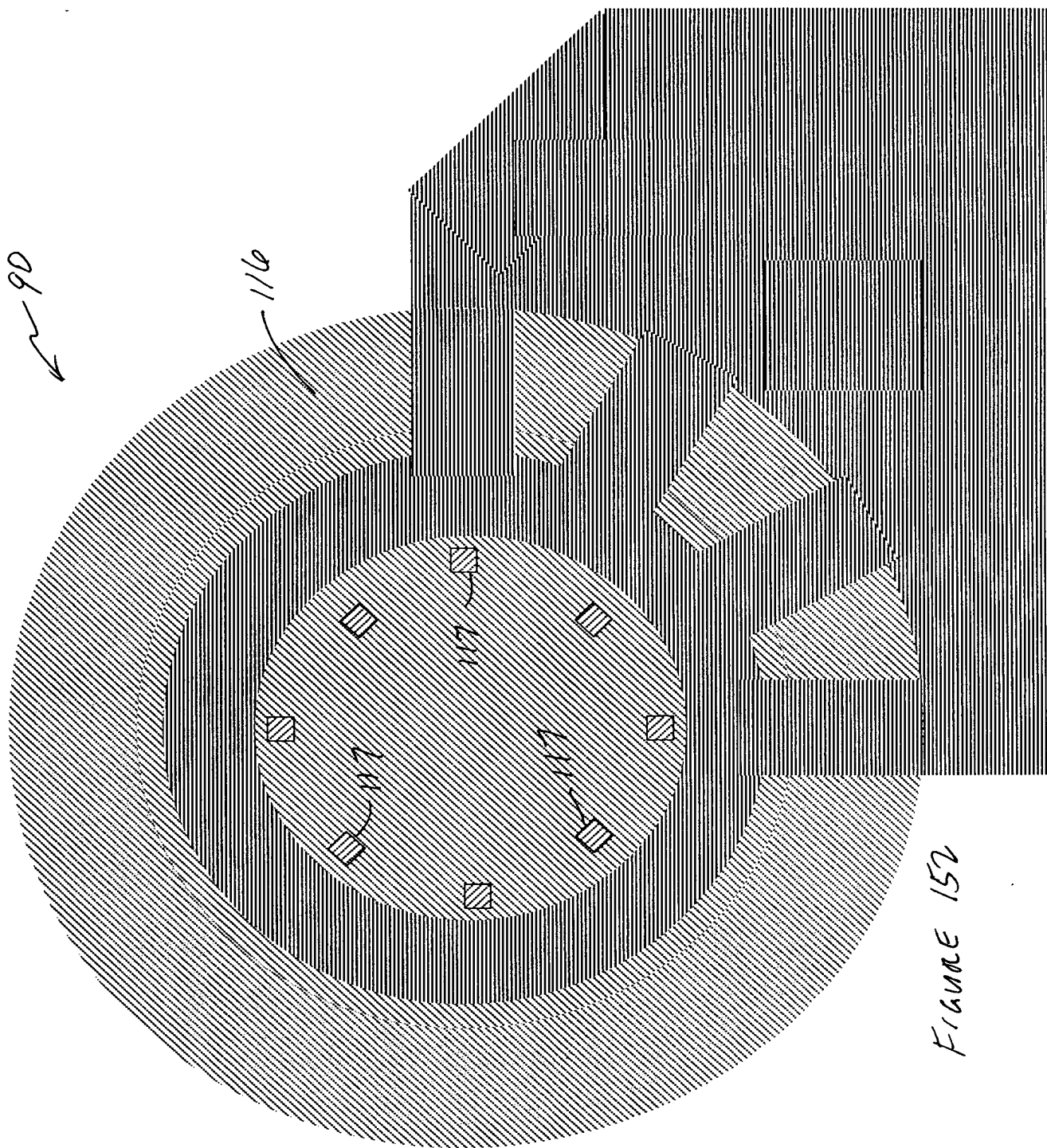


FIGURE 152

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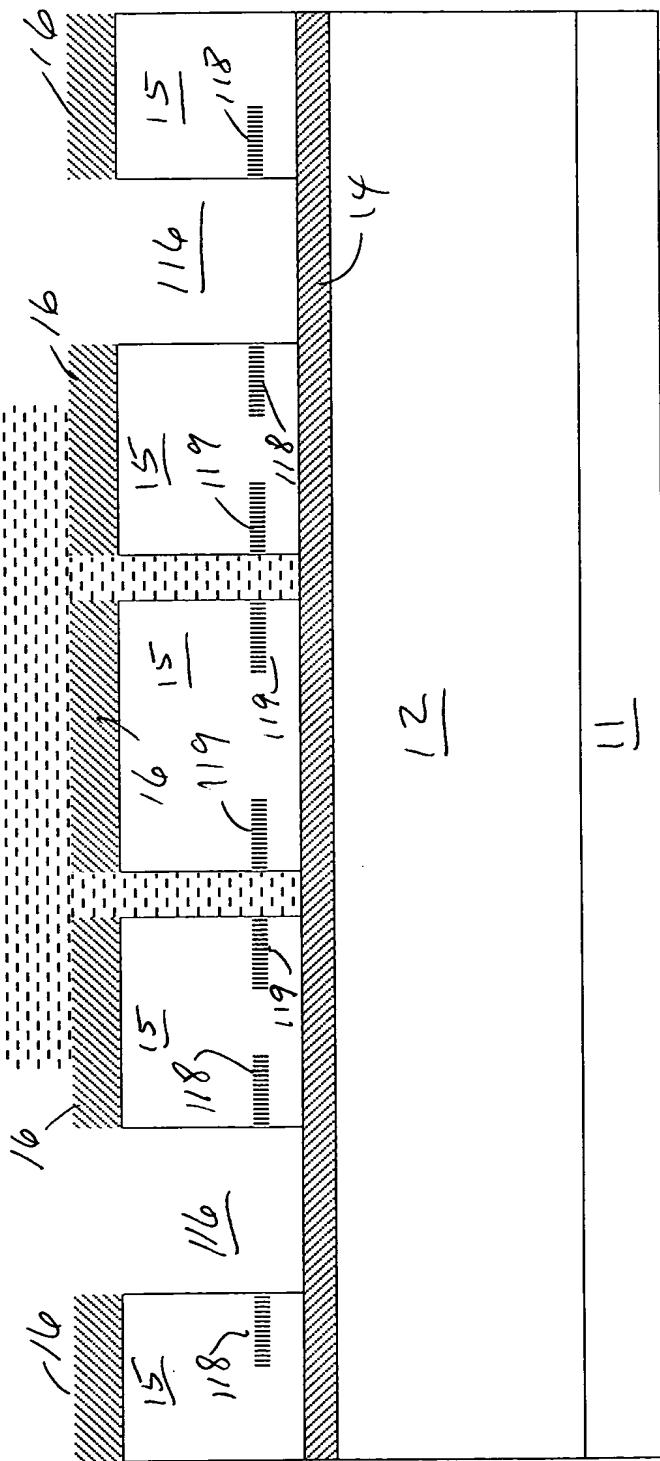


FIGURE 153

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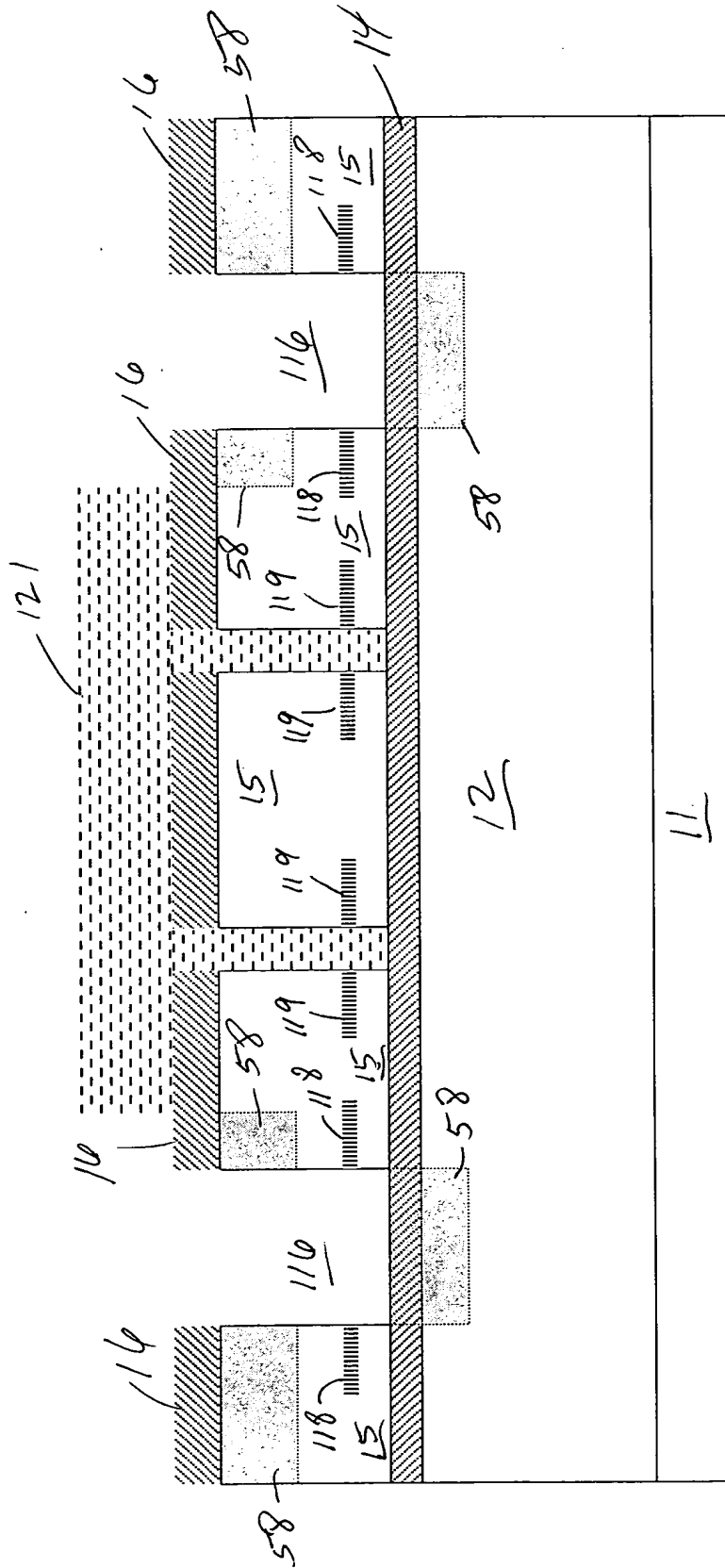


Figure 154

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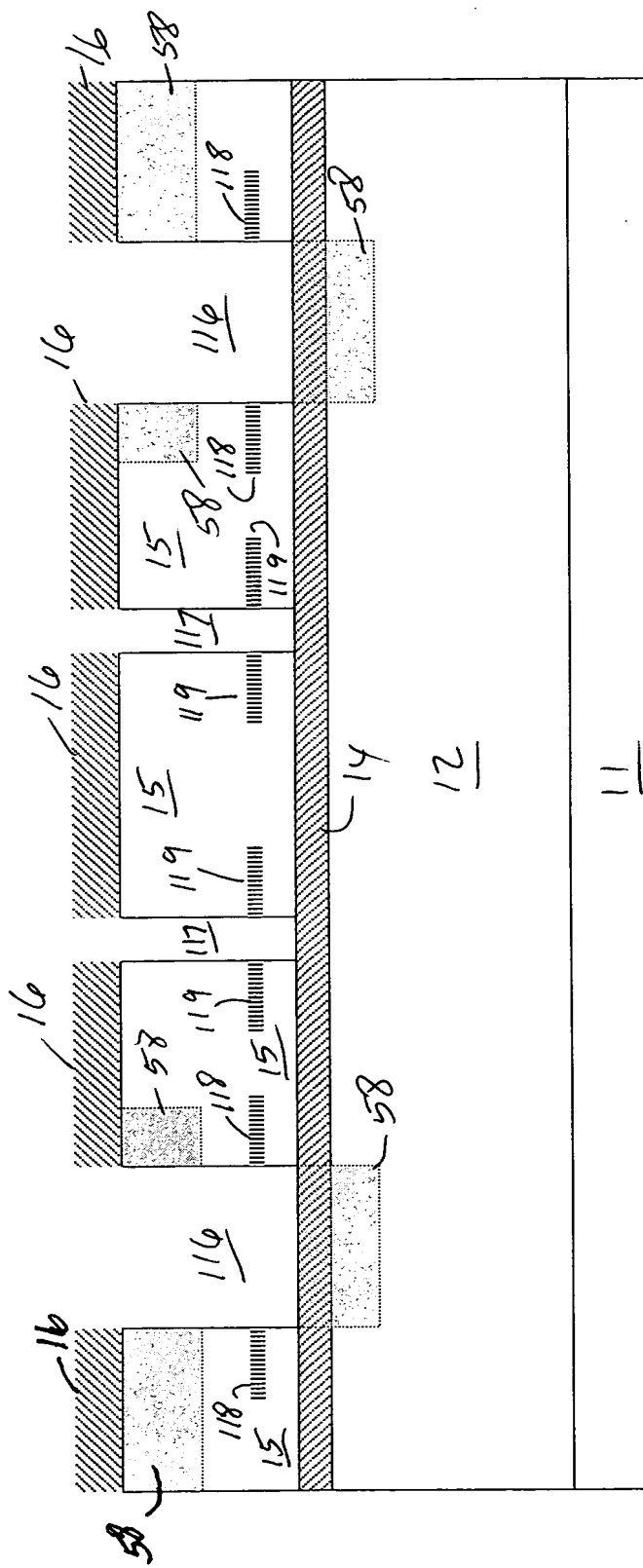


FIGURE 155

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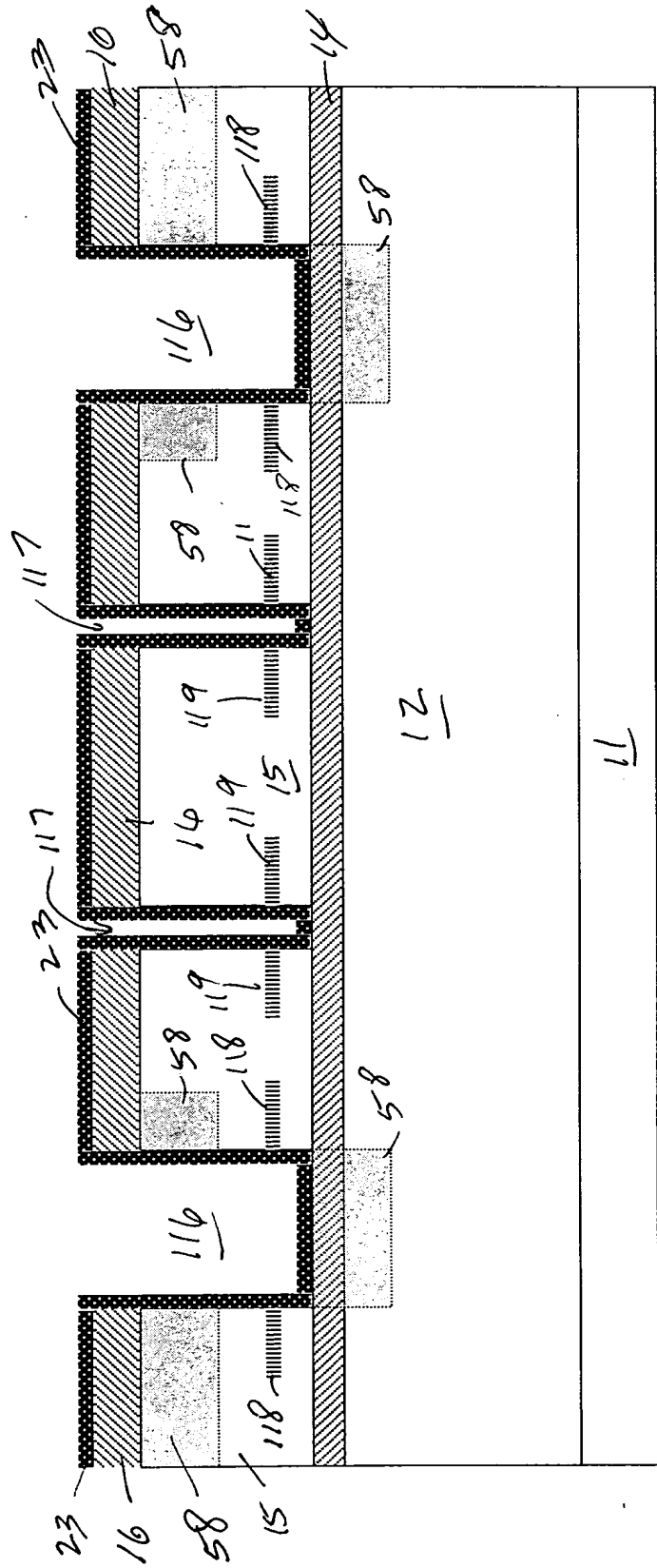


FIGURE 156

90 ↗

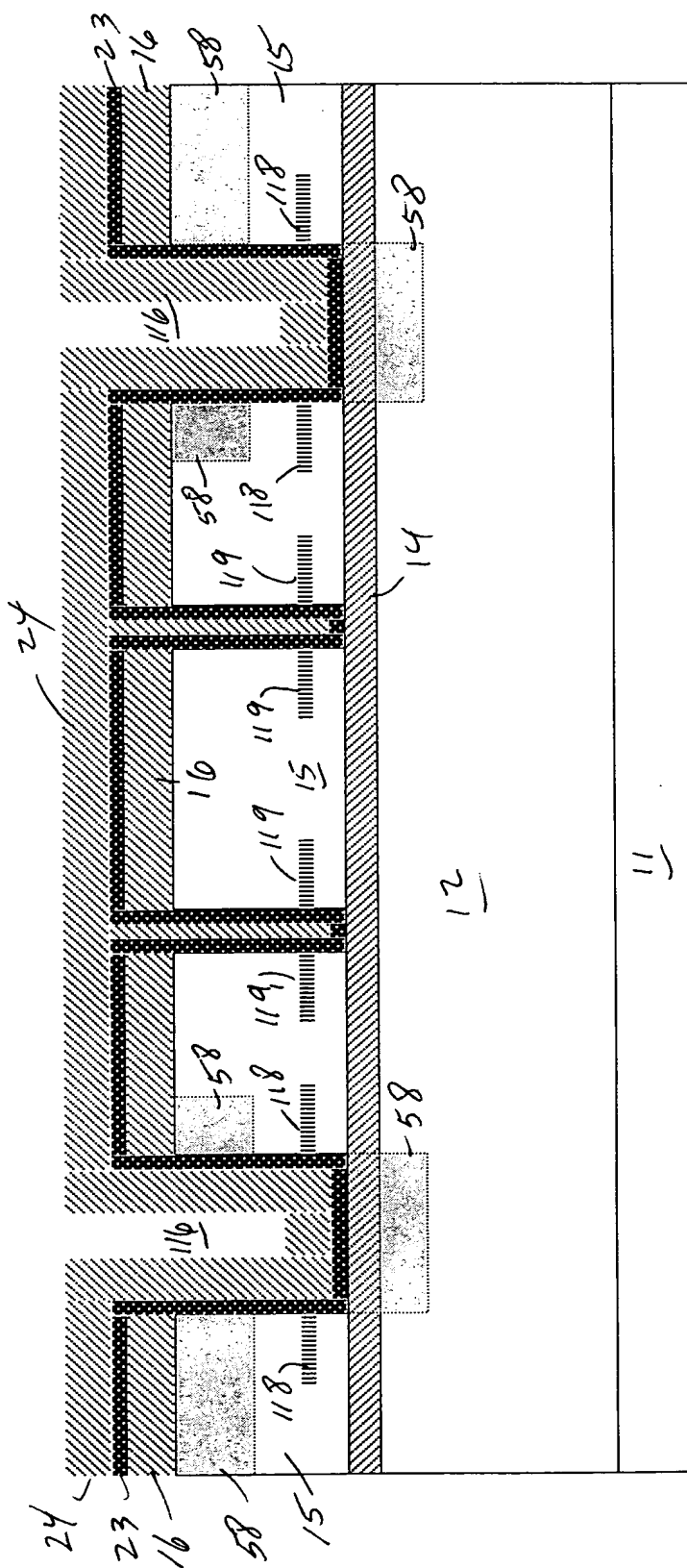
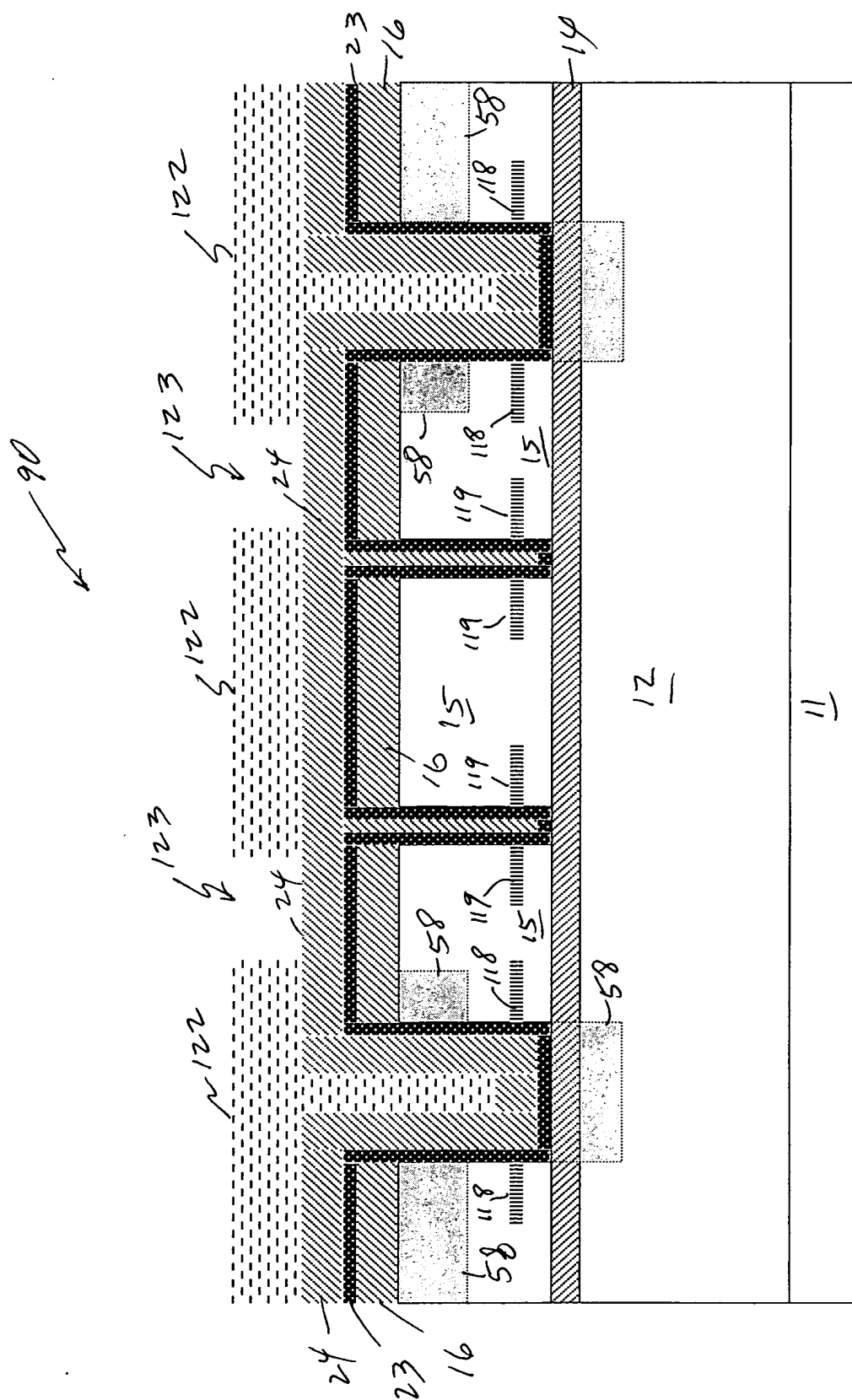


FIGURE 157



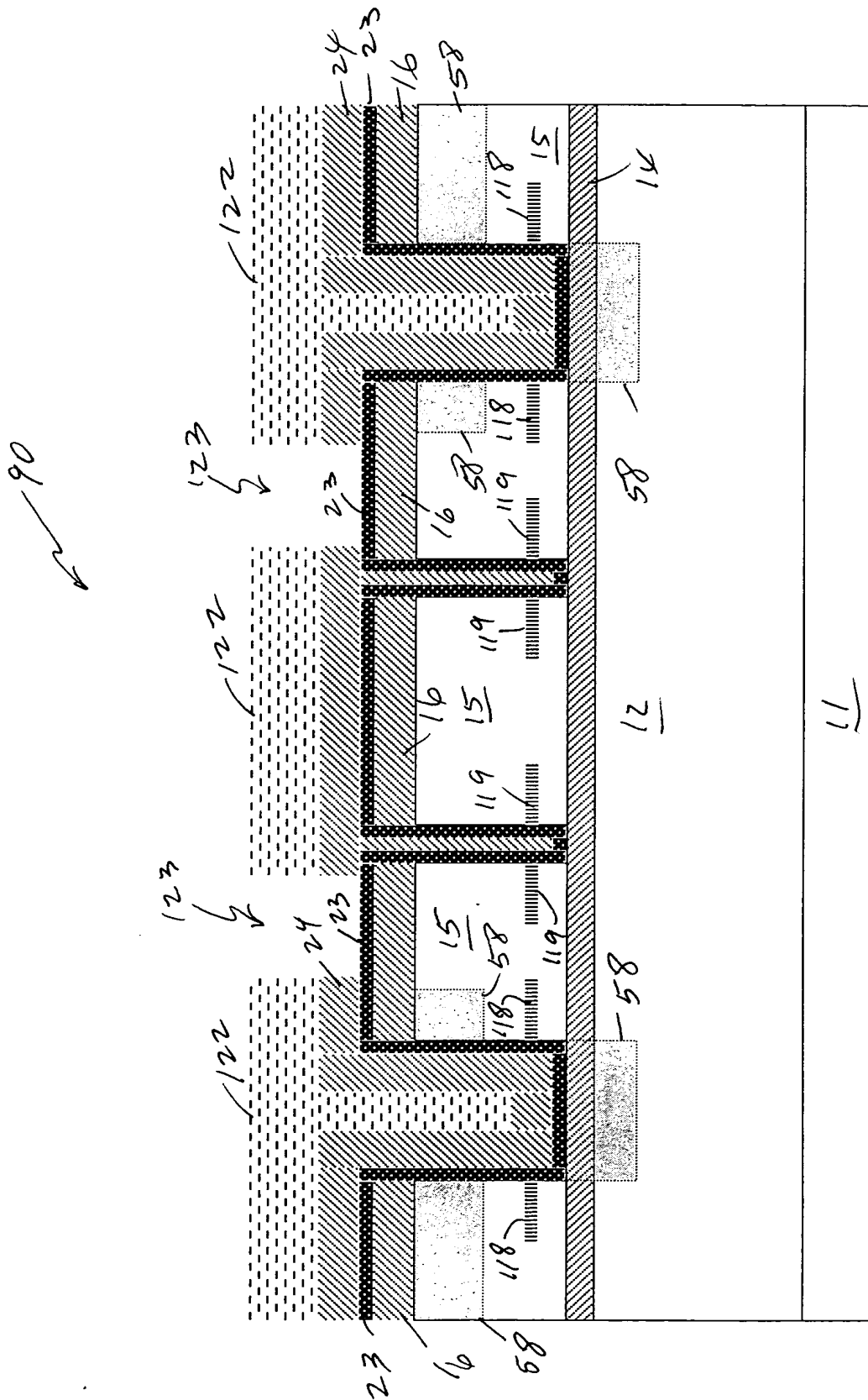


FIGURE 159

90 ↗

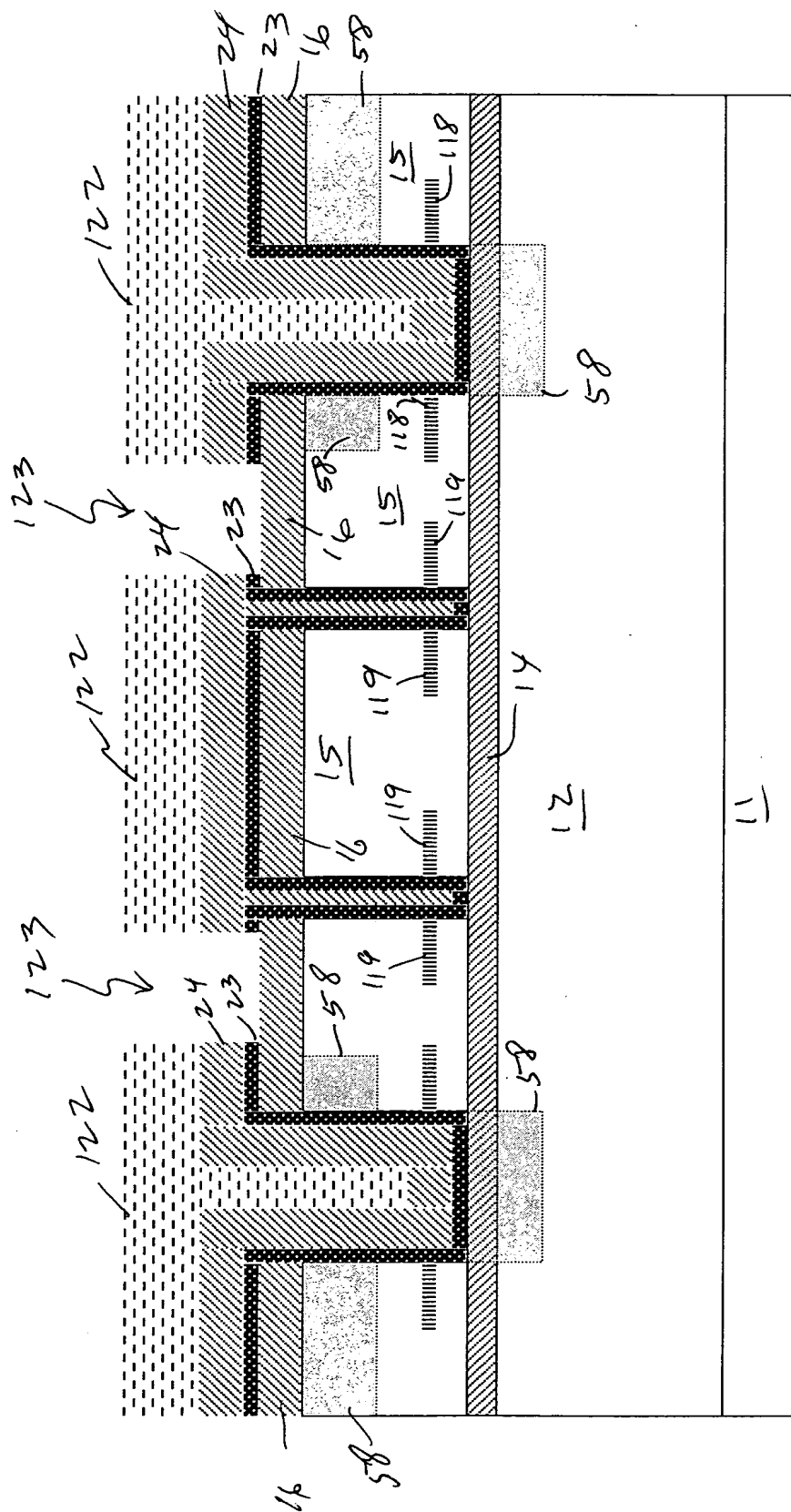


FIGURE 160

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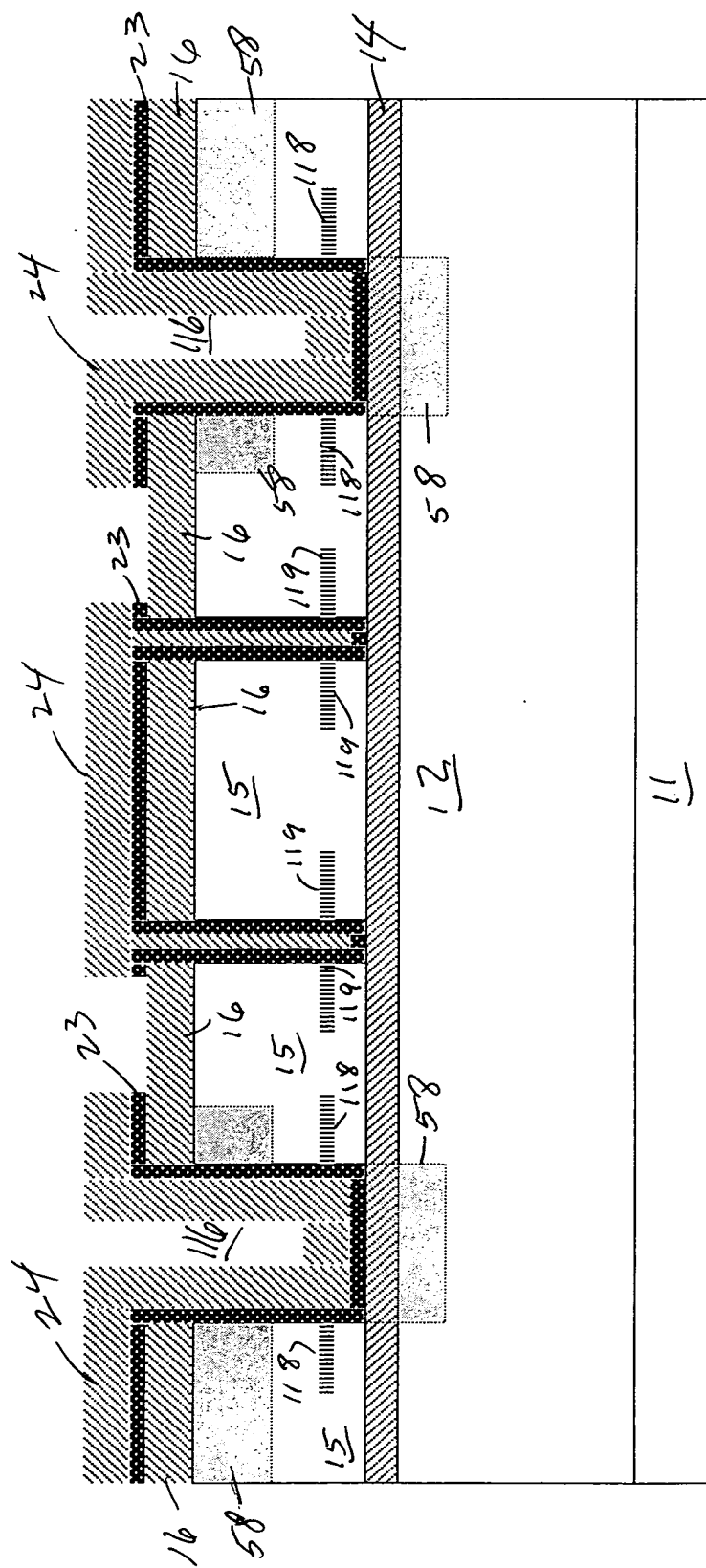


FIGURE 161

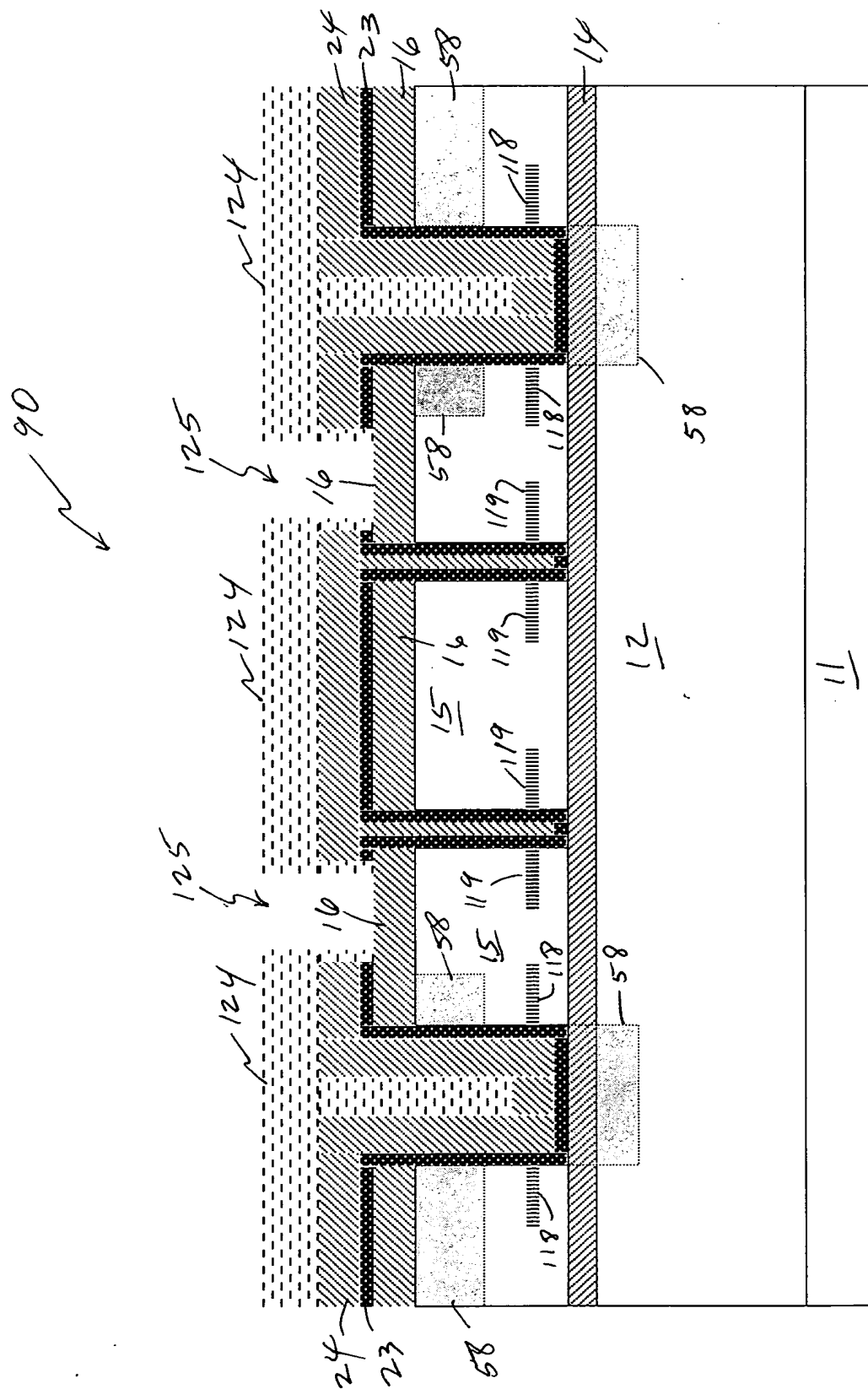
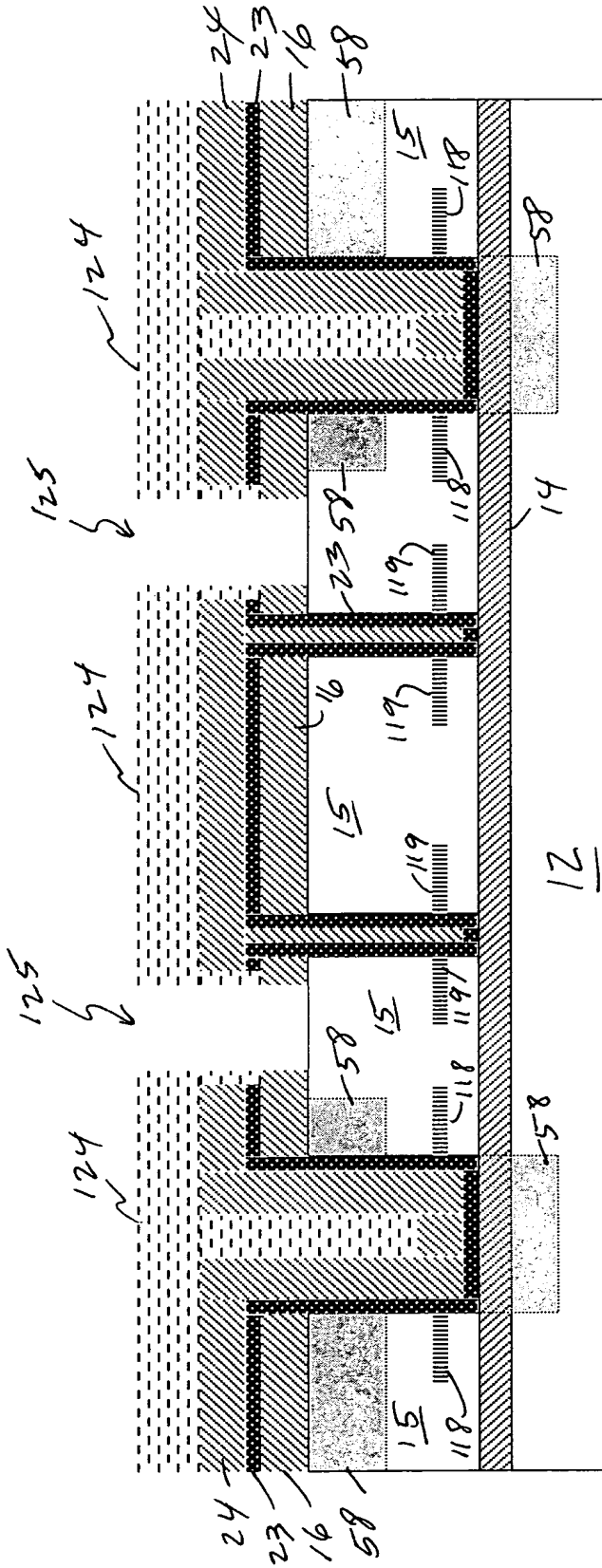


FIGURE 162

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FIGURE 163

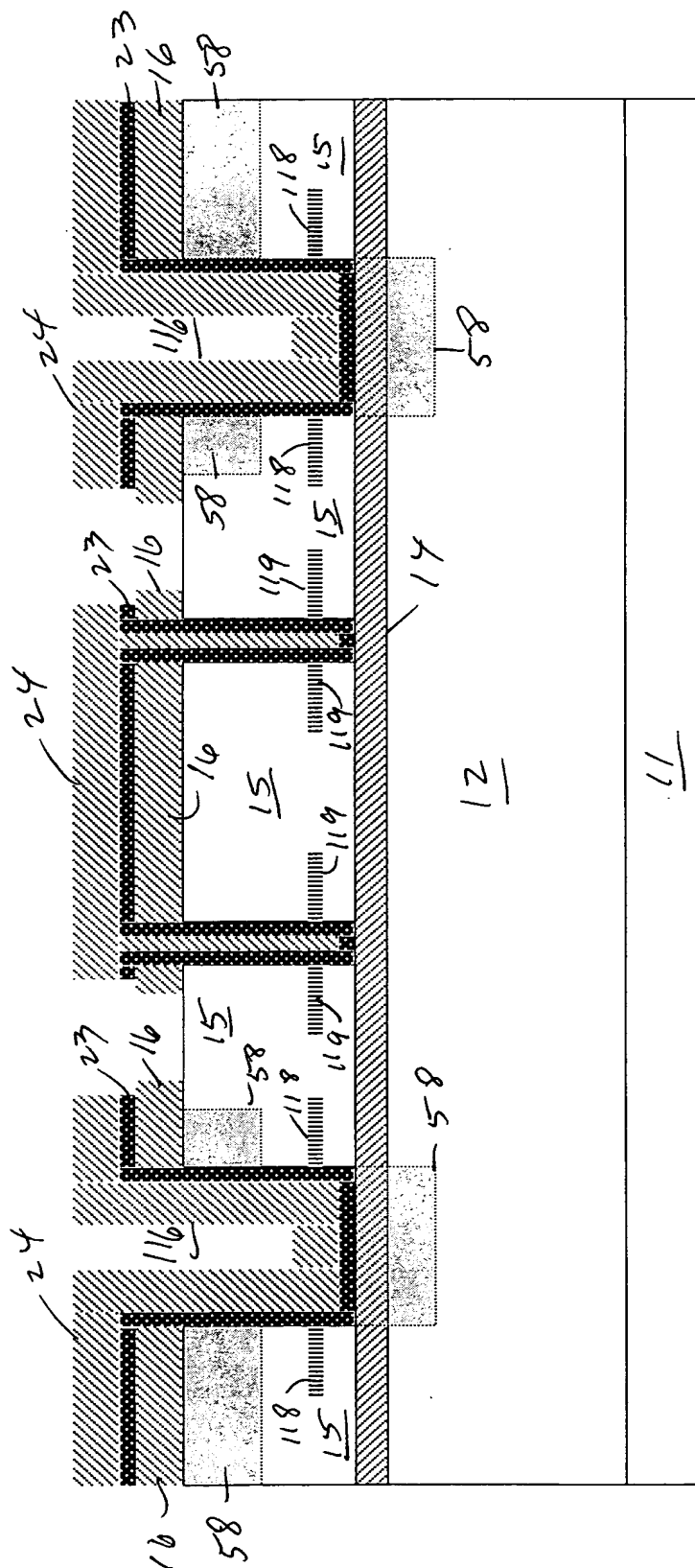
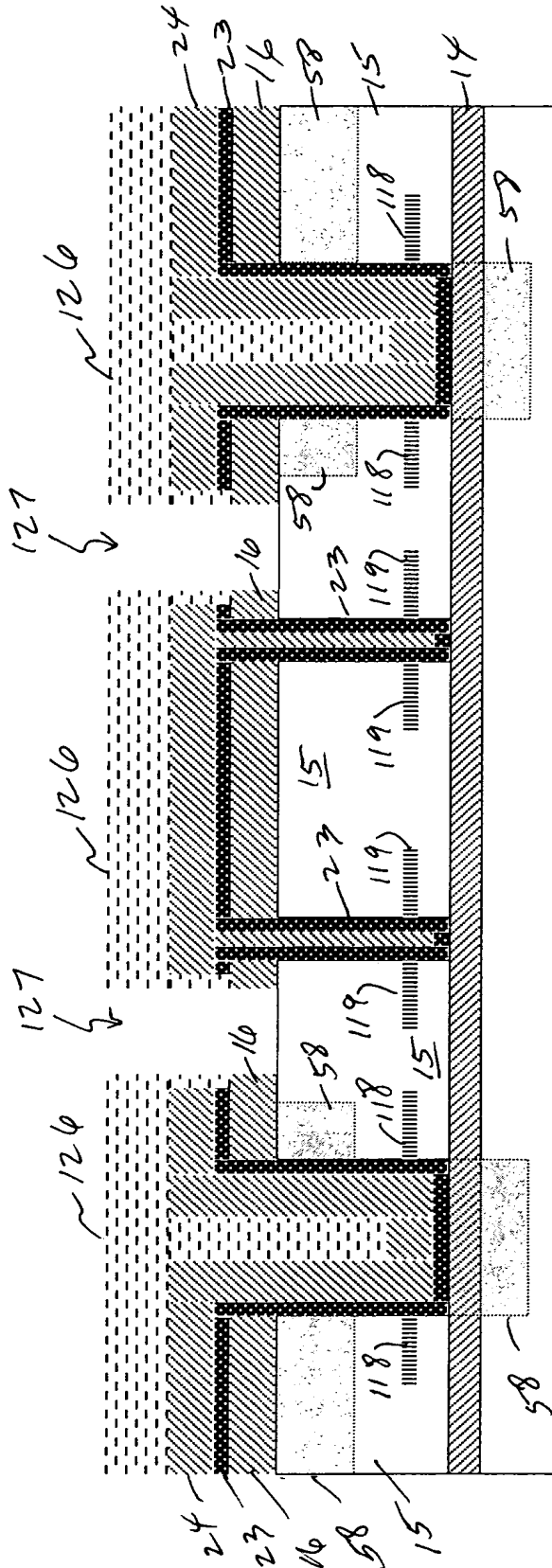


FIGURE 164

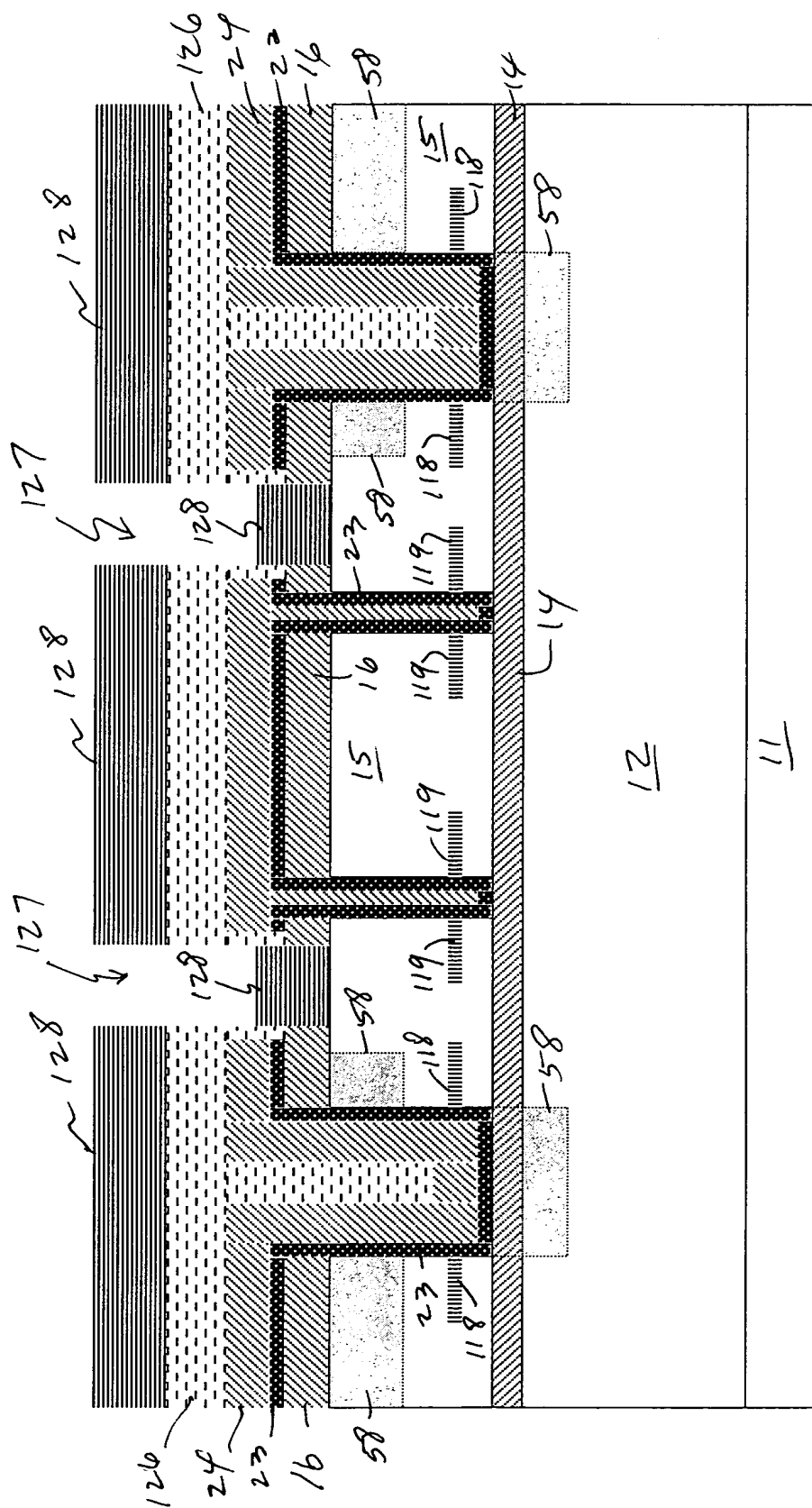
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FIGURE 165



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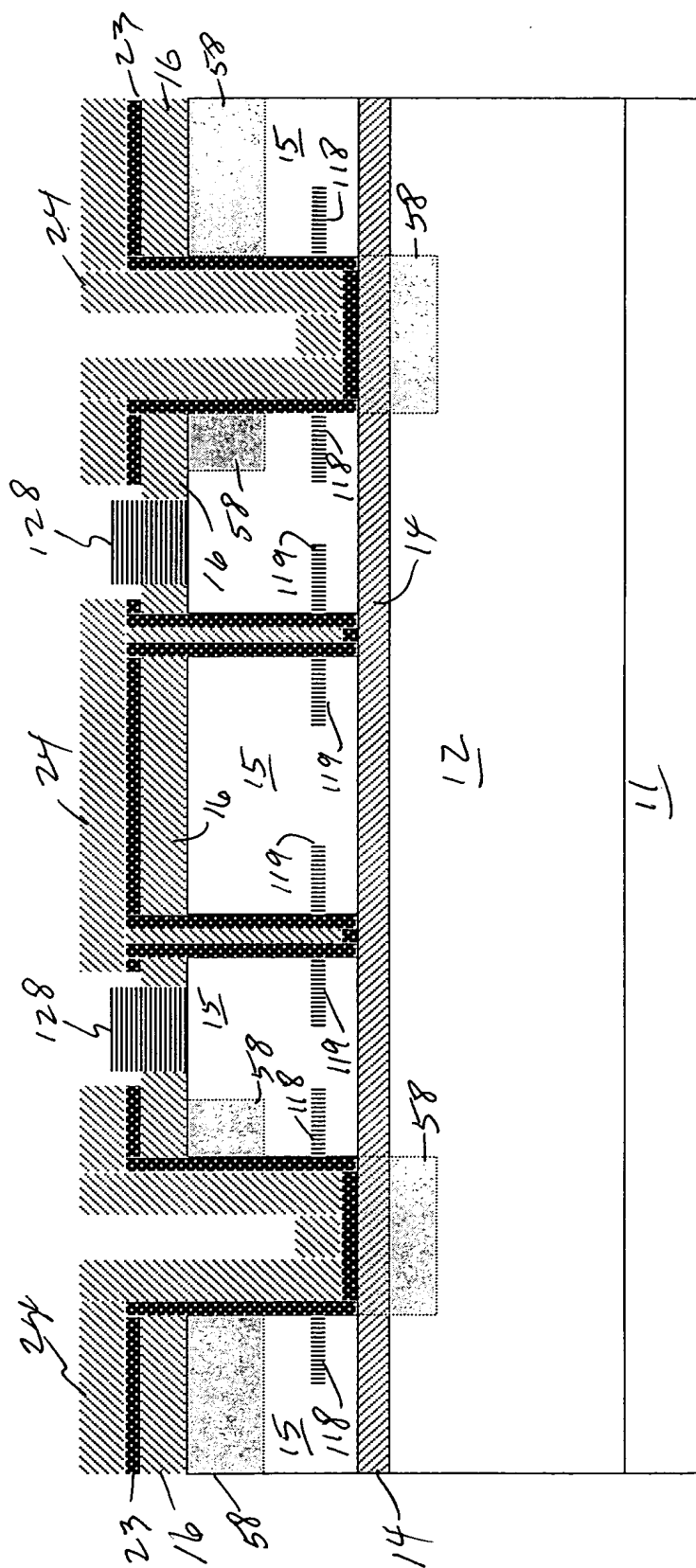
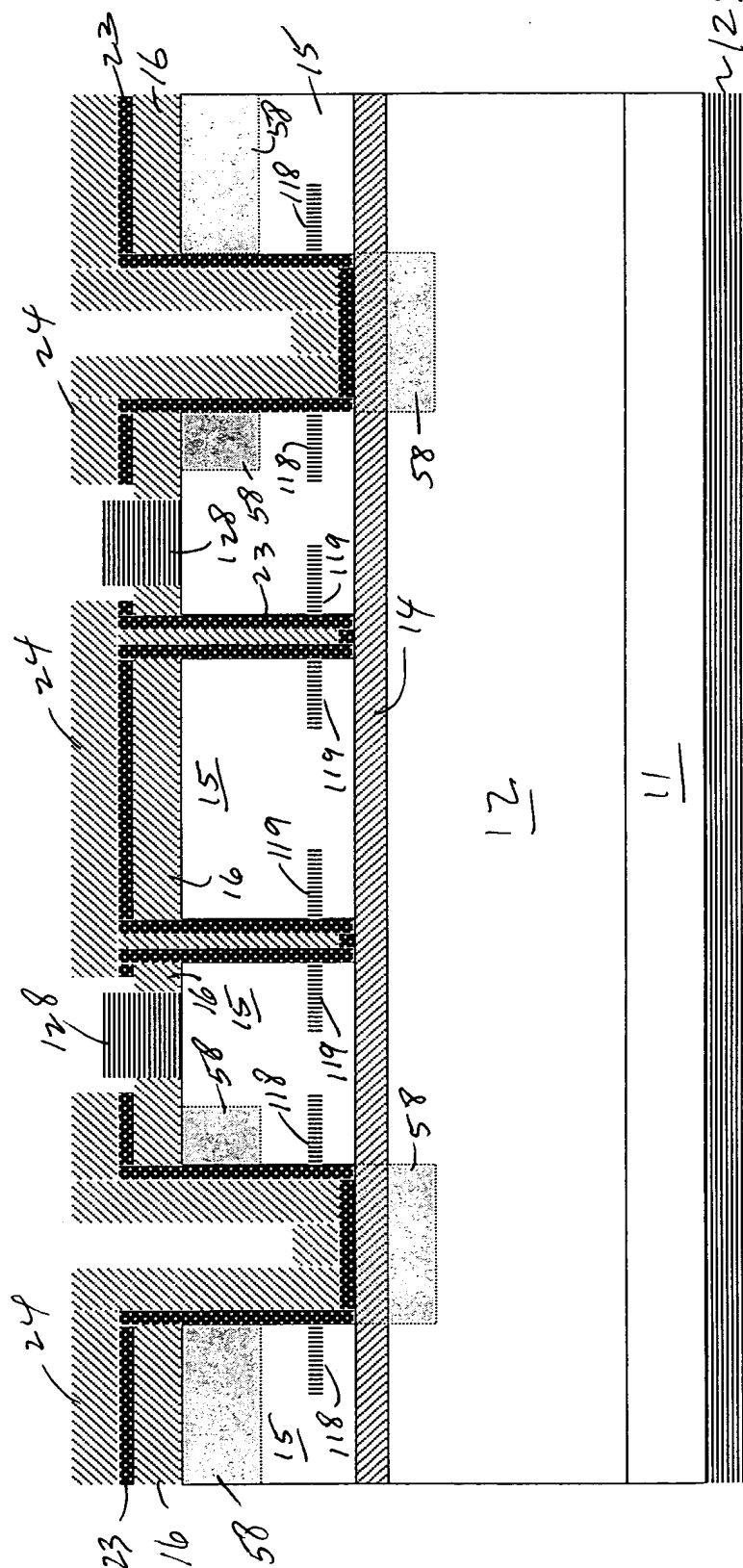


FIGURE 107

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100 ↗

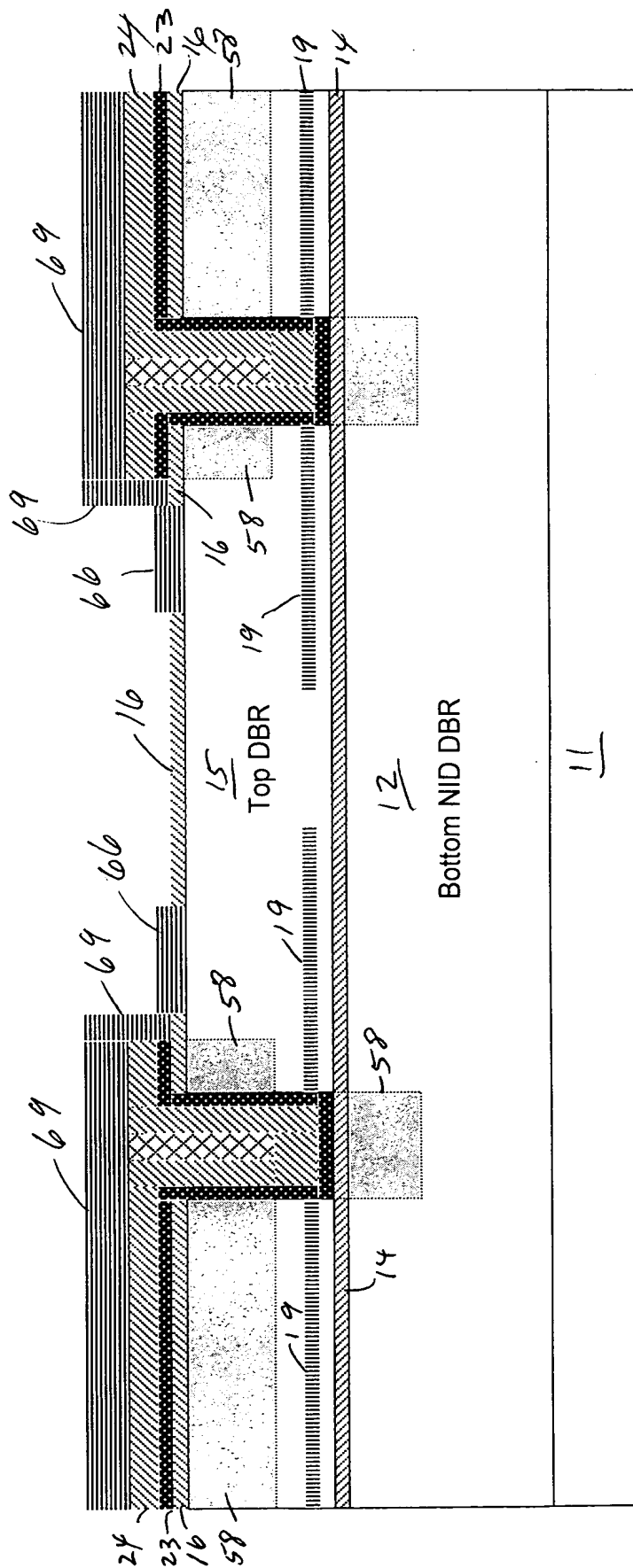


FIGURE 169

100

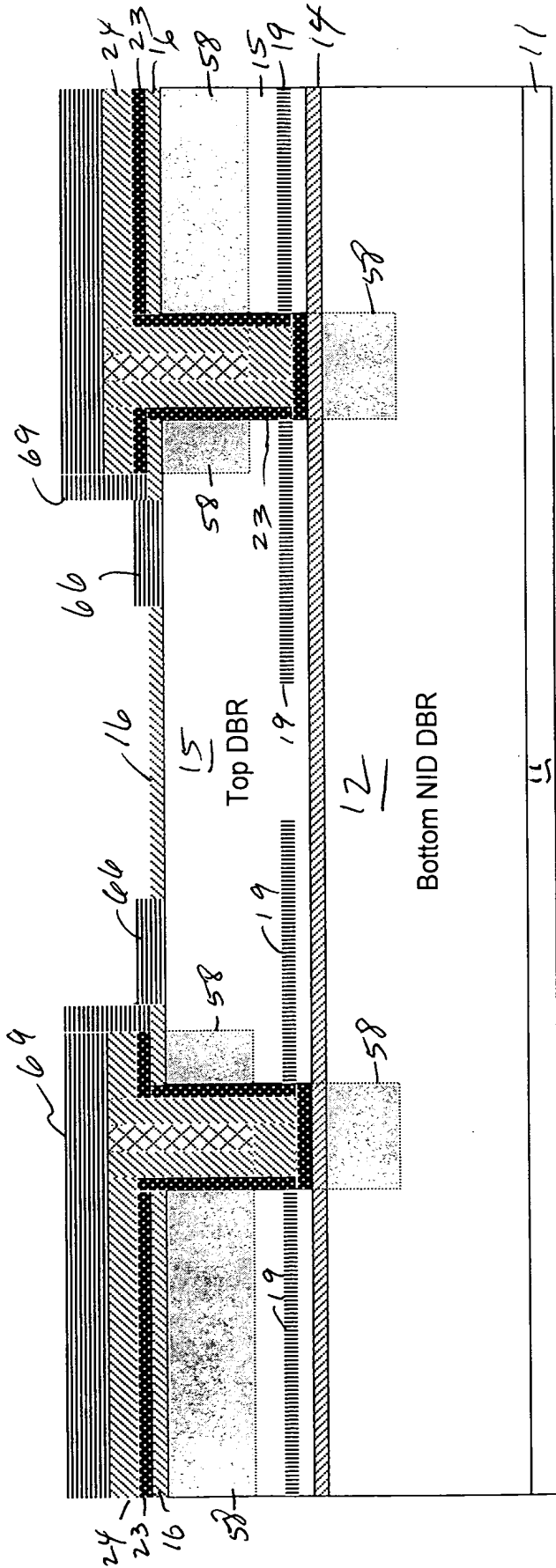


FIGURE 170

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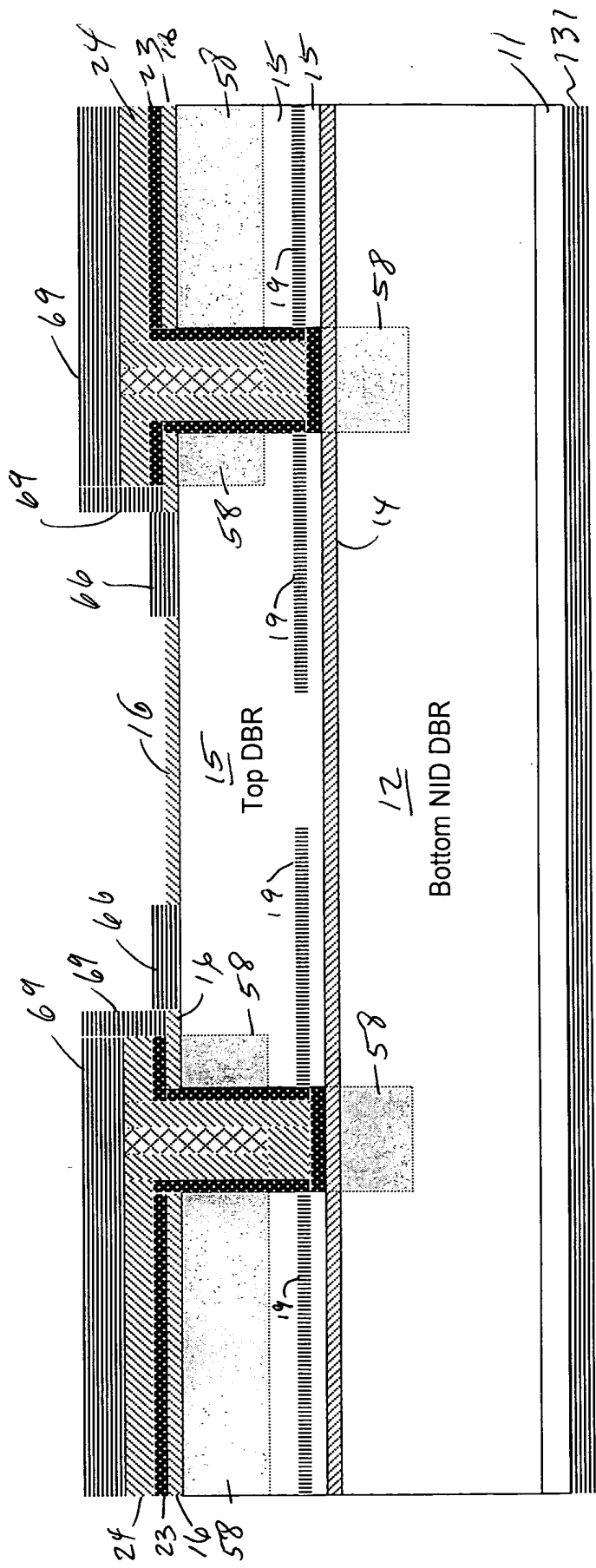


FIGURE 171

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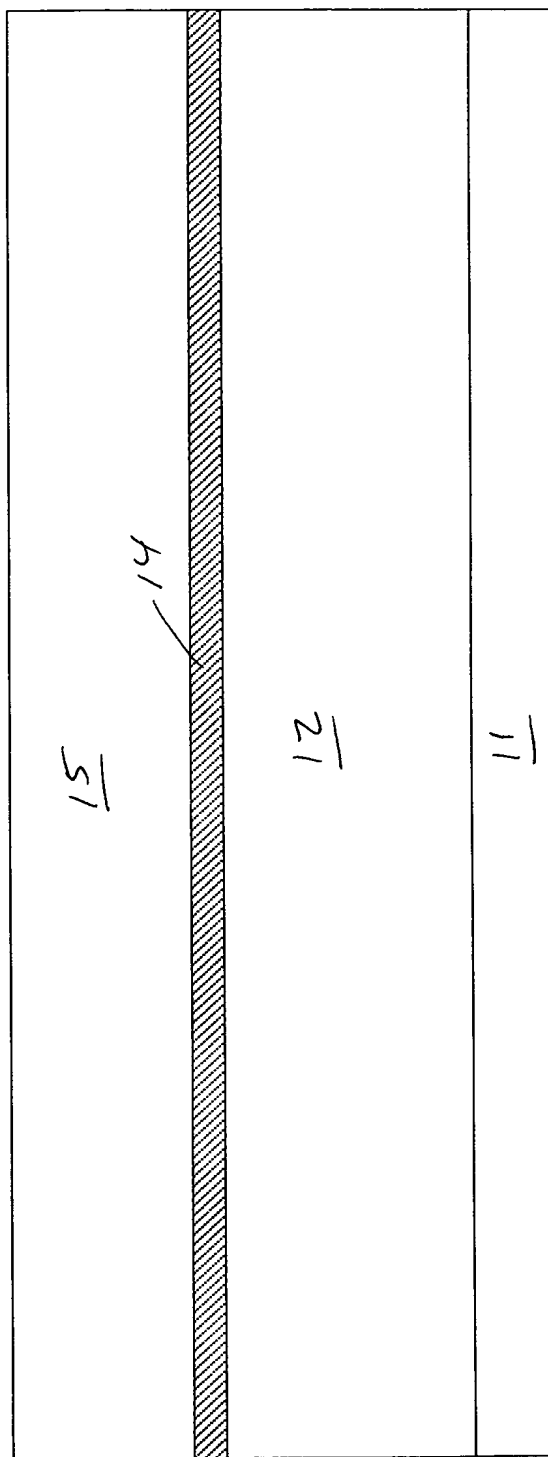


FIGURE 172

110

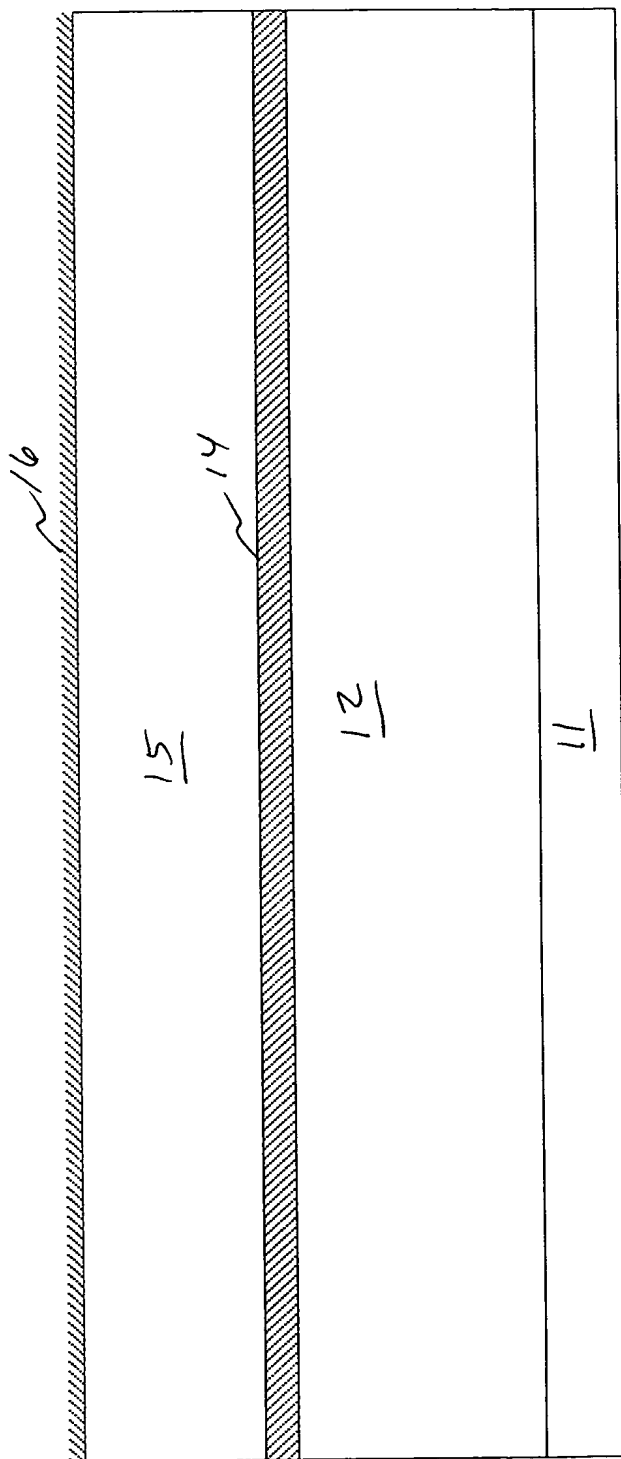


FIGURE 173

110

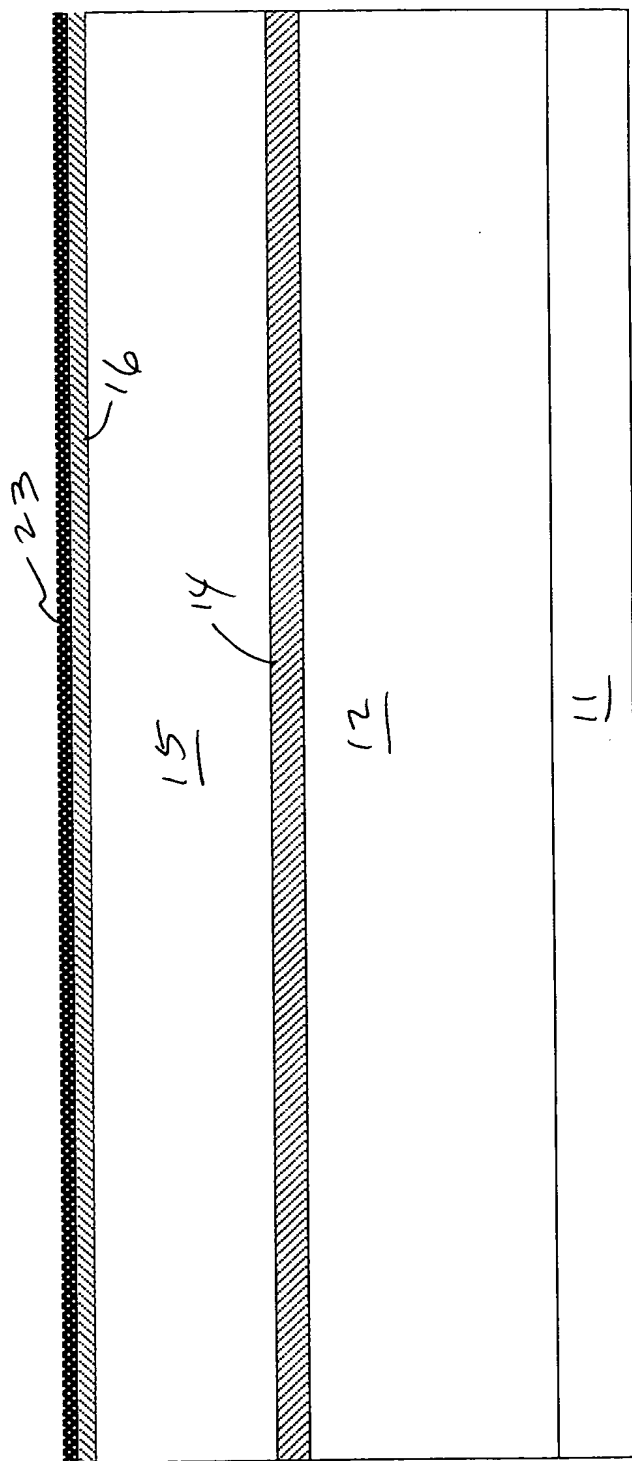


FIGURE 174

110

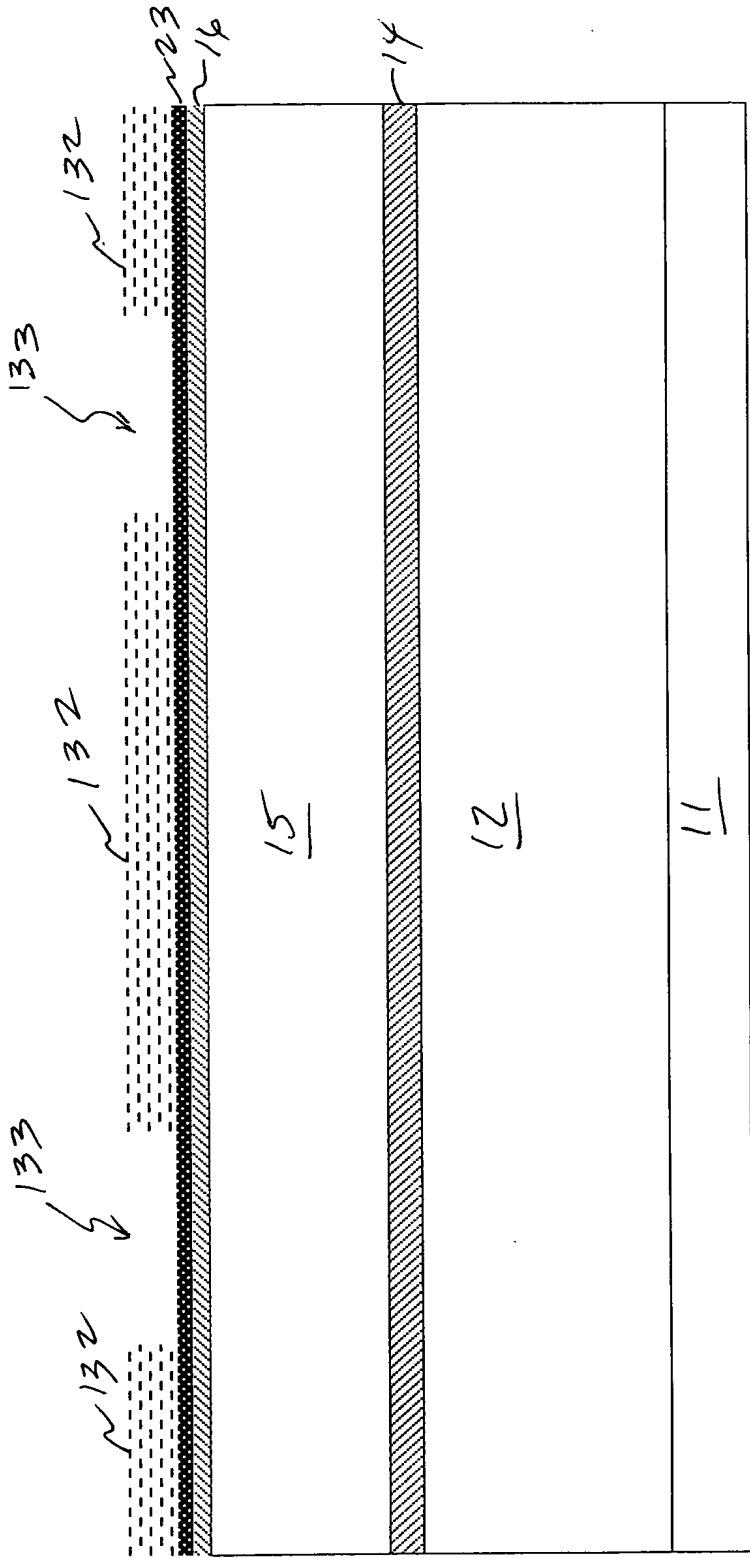


FIGURE 175

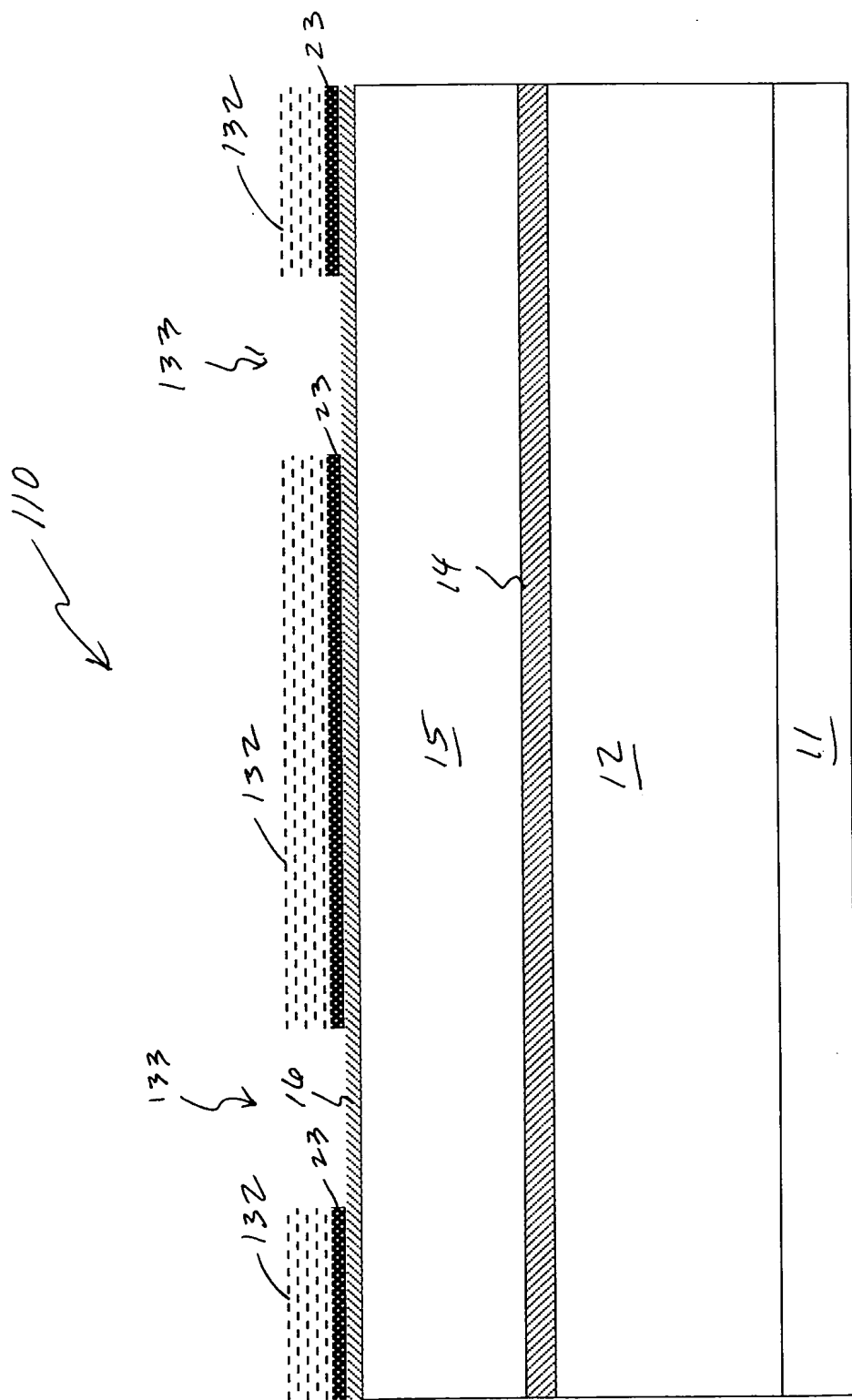


FIGURE 176

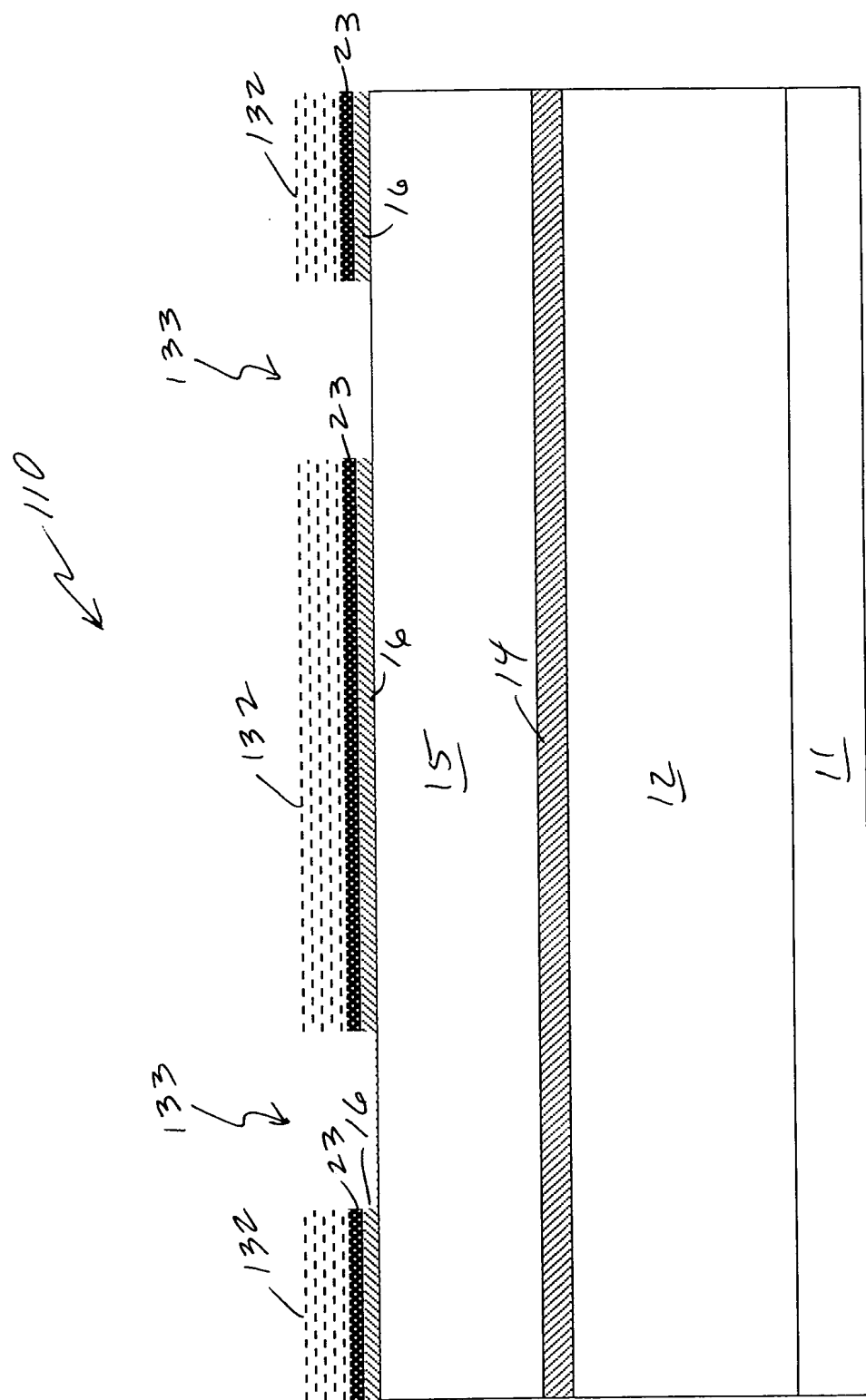


FIGURE 177

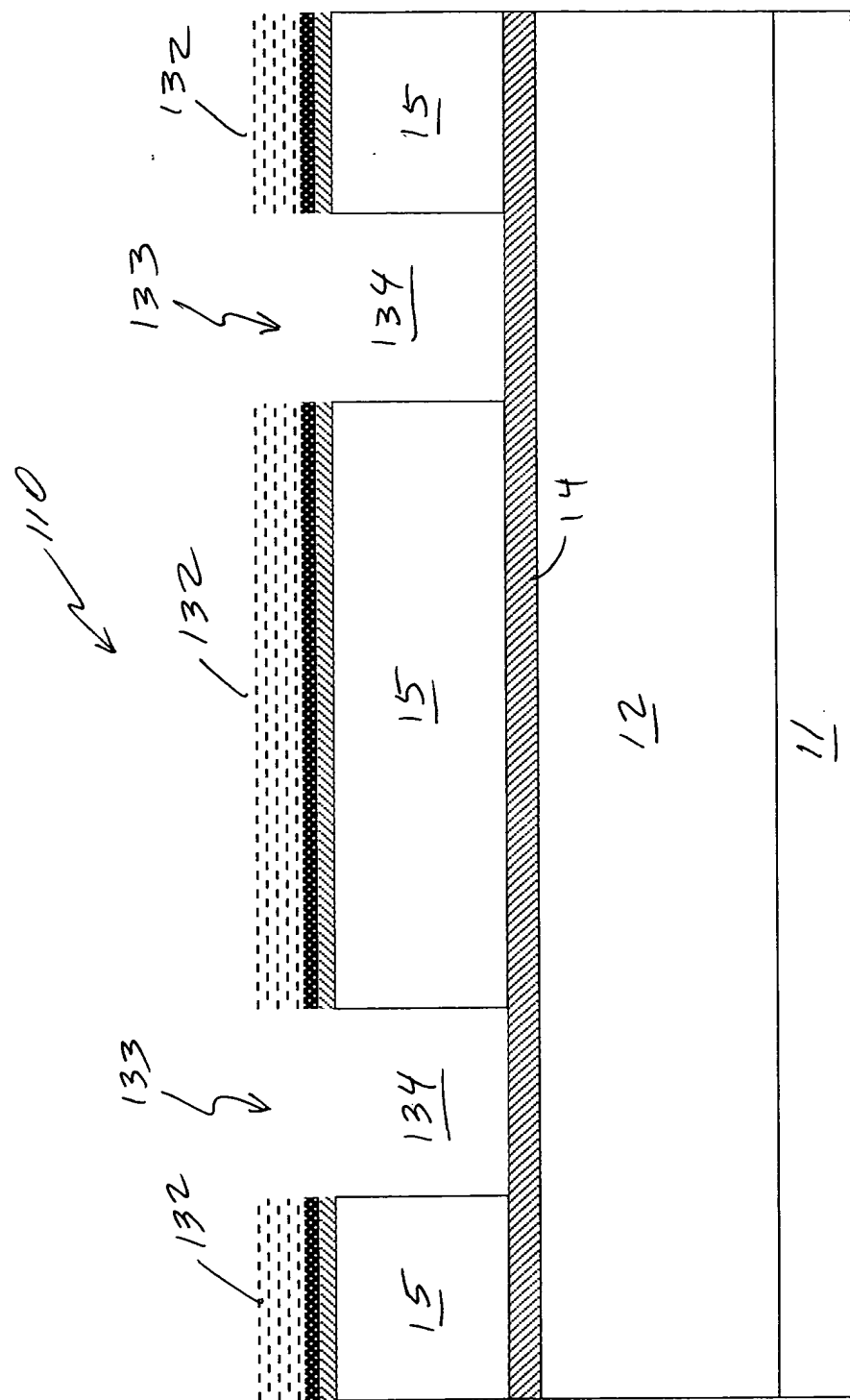


FIGURE 178

110 ↗

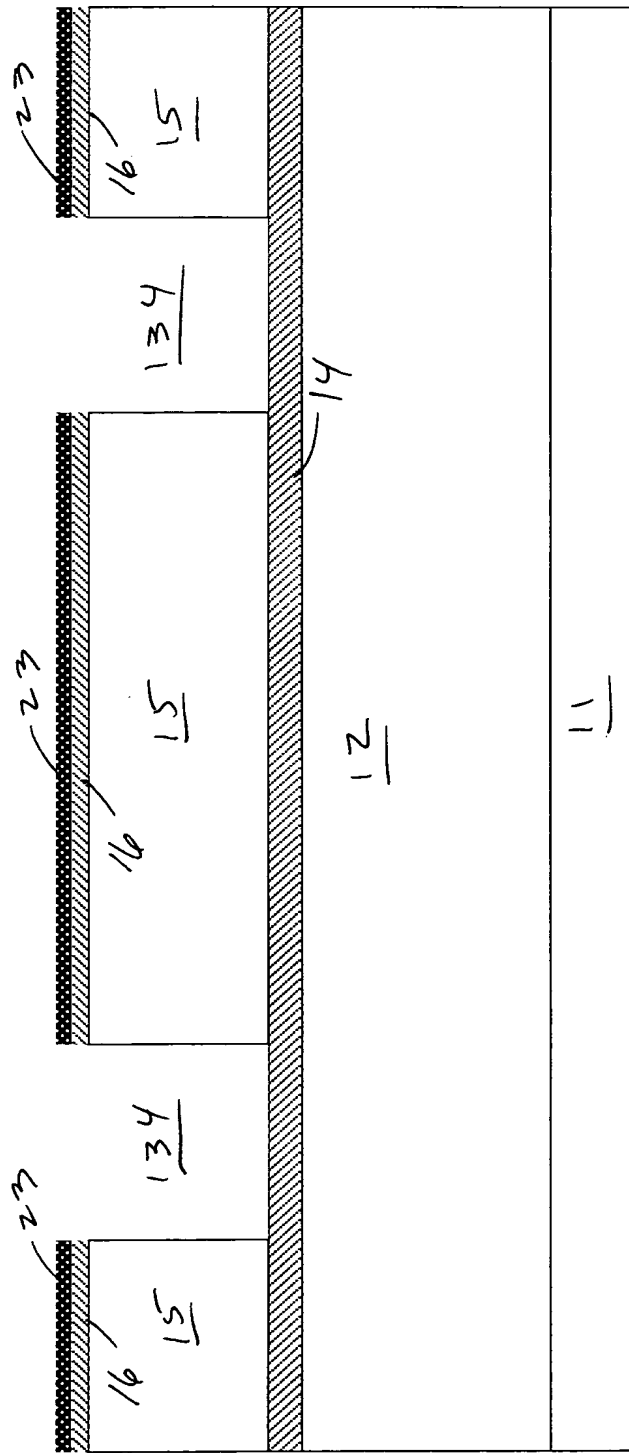


FIGURE 179

110 ↗

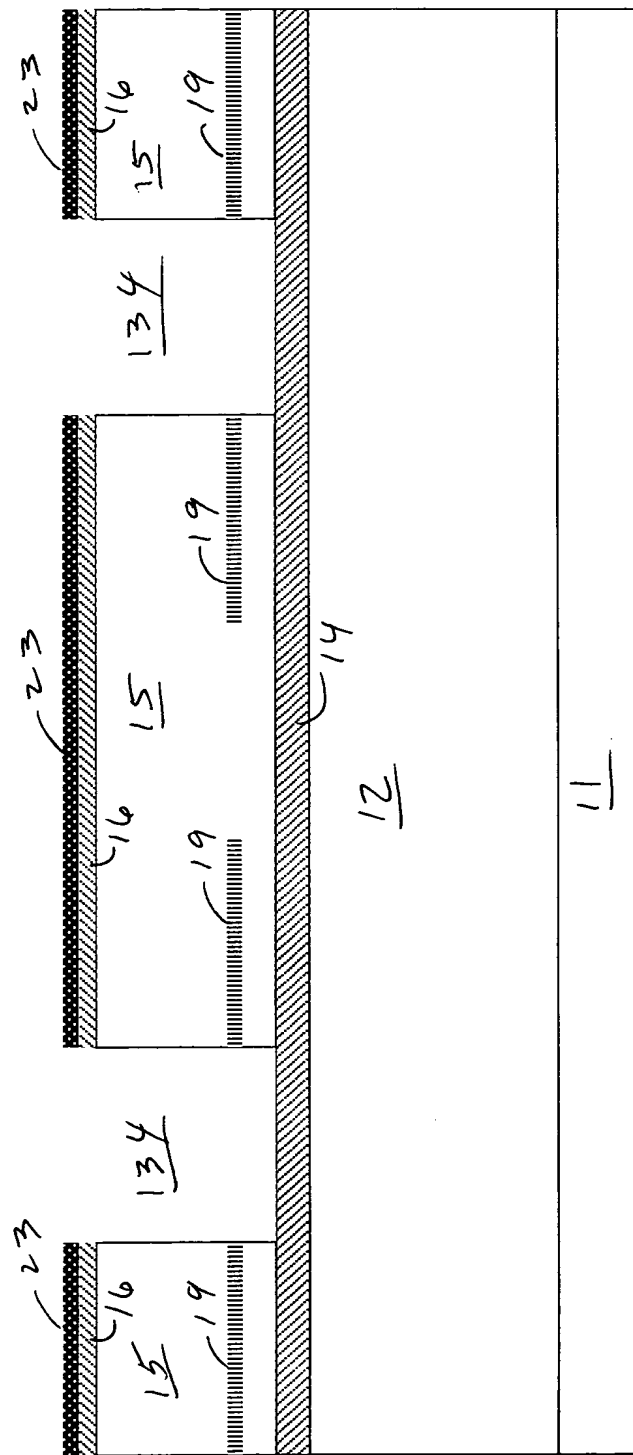


FIGURE 180

110

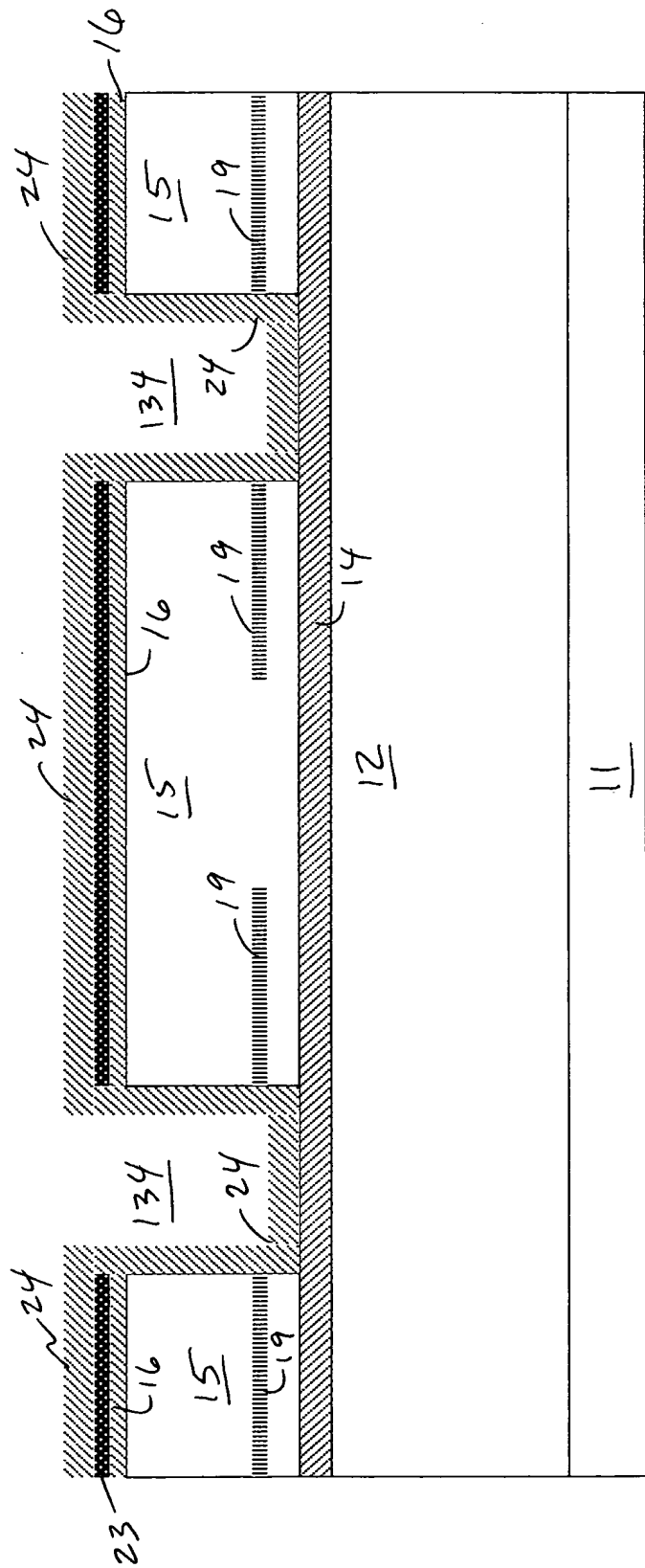


FIGURE 181

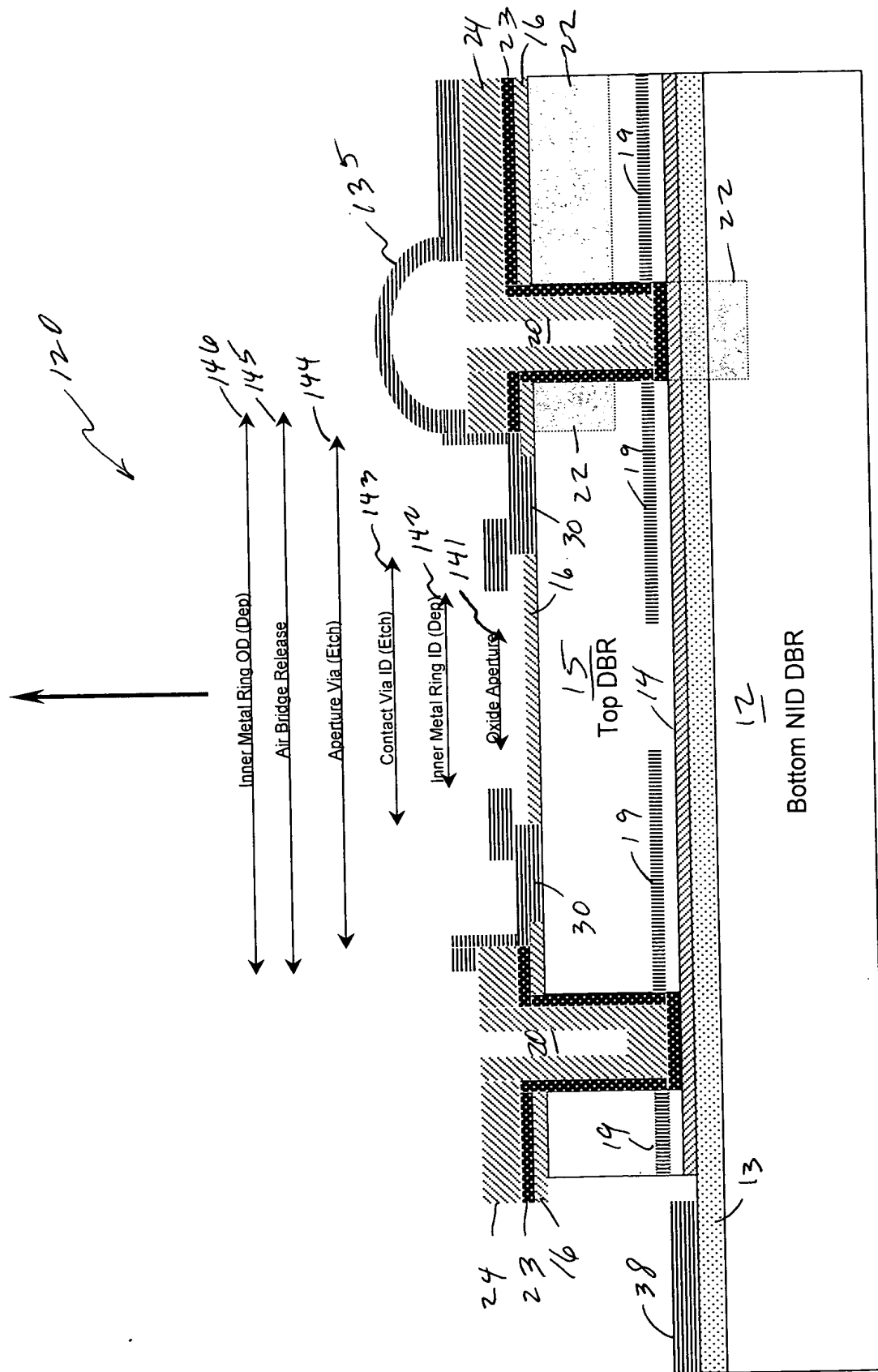


FIGURE 132

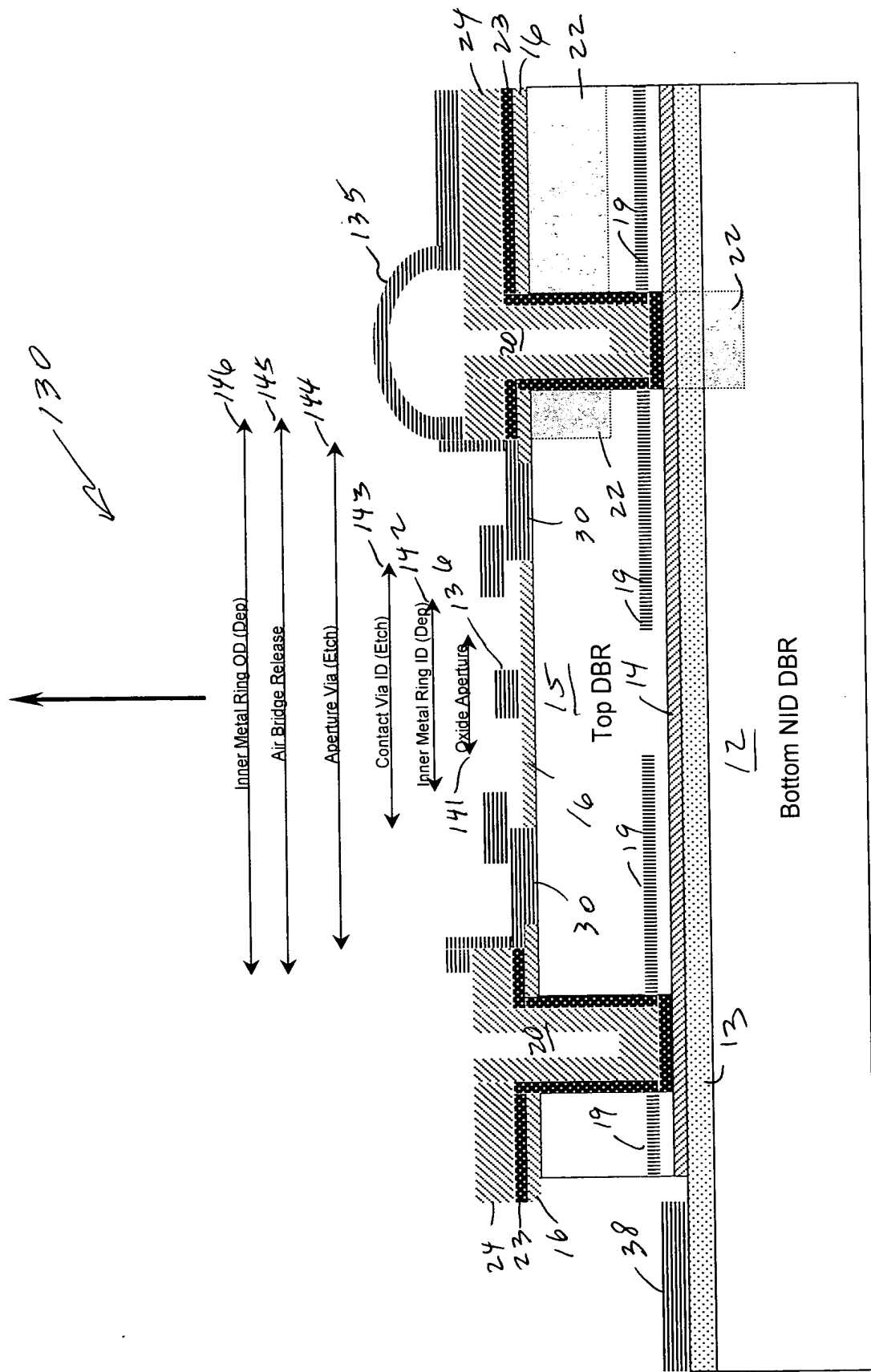


FIGURE 183

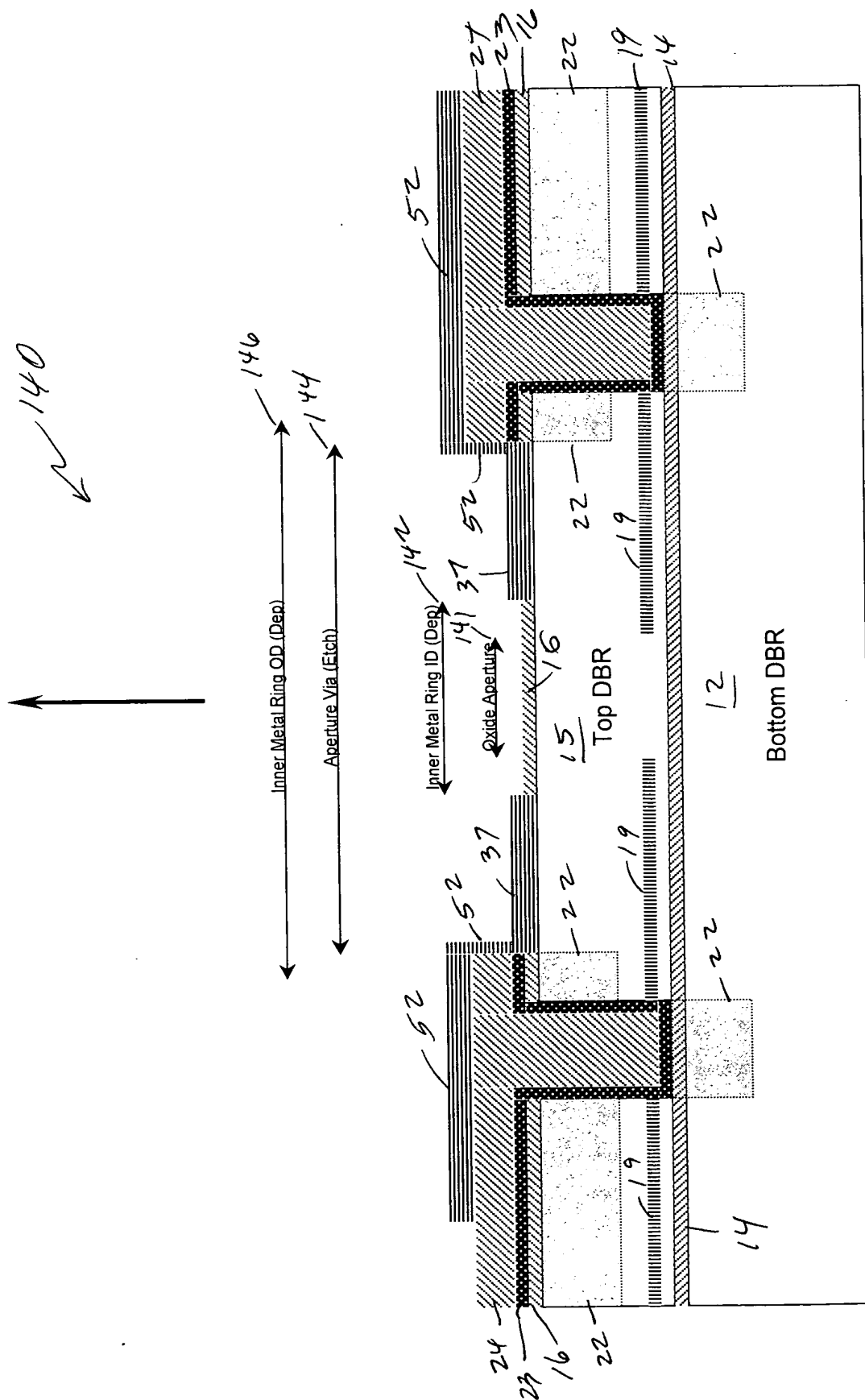
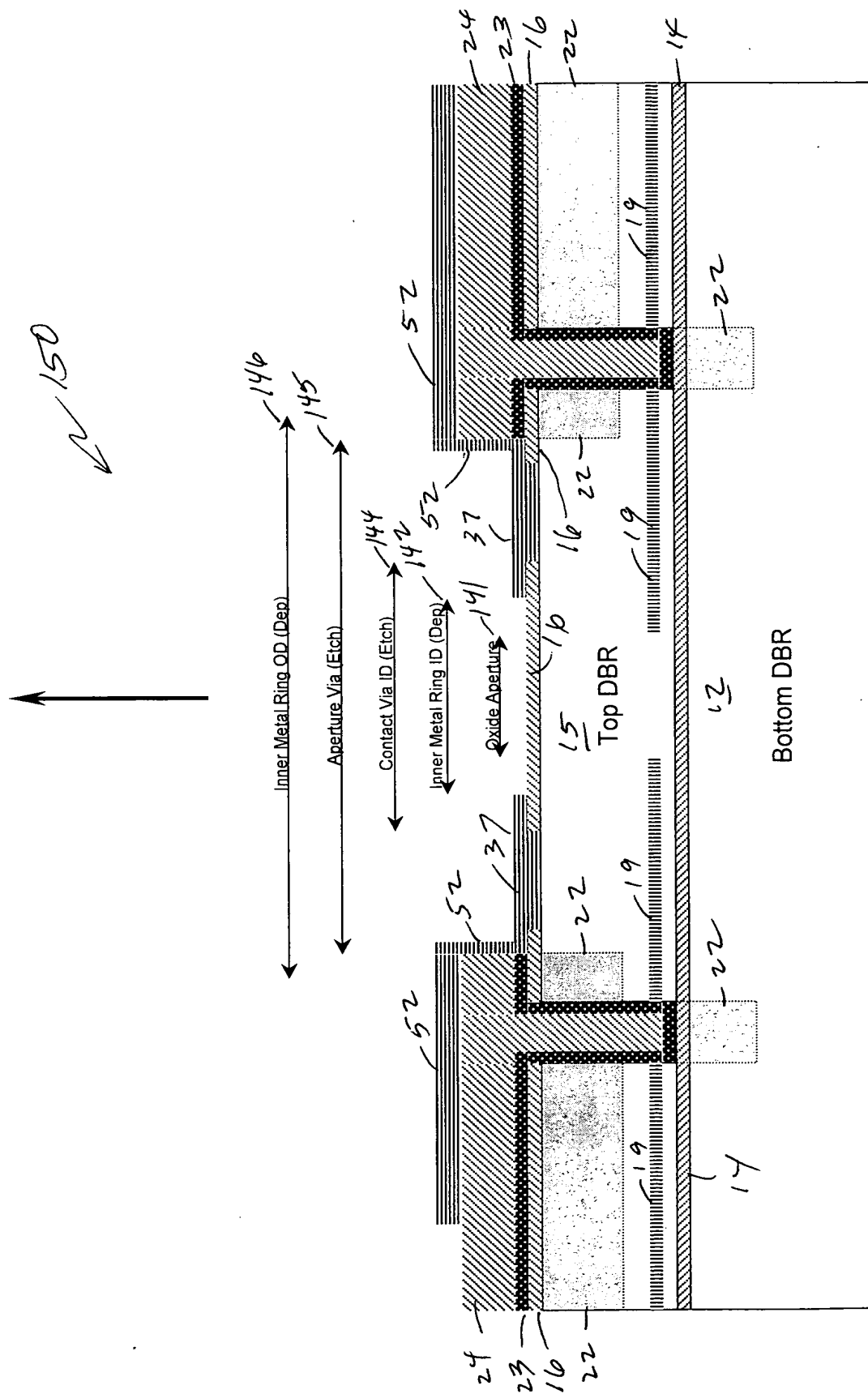


Figure 184



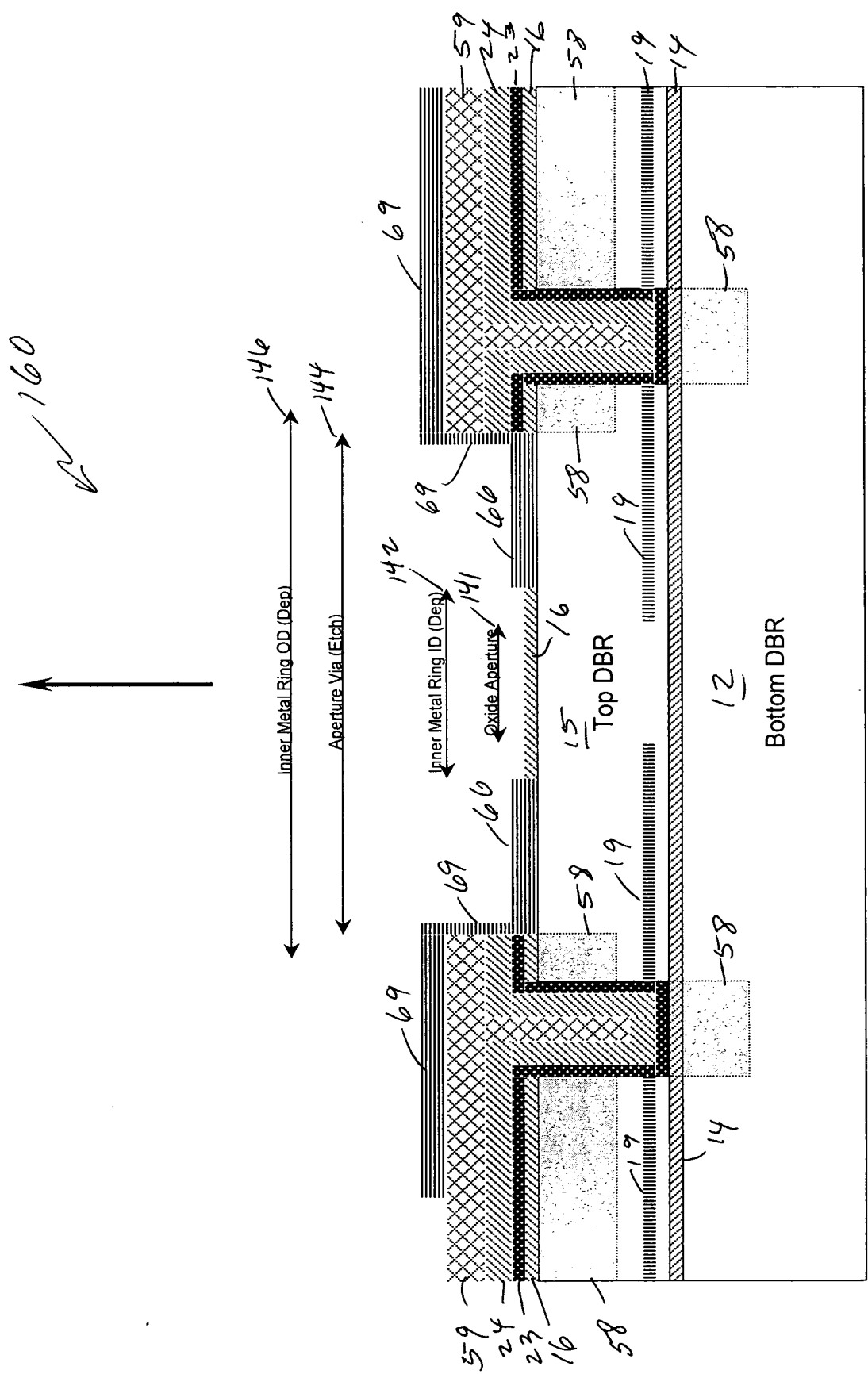


FIGURE 186

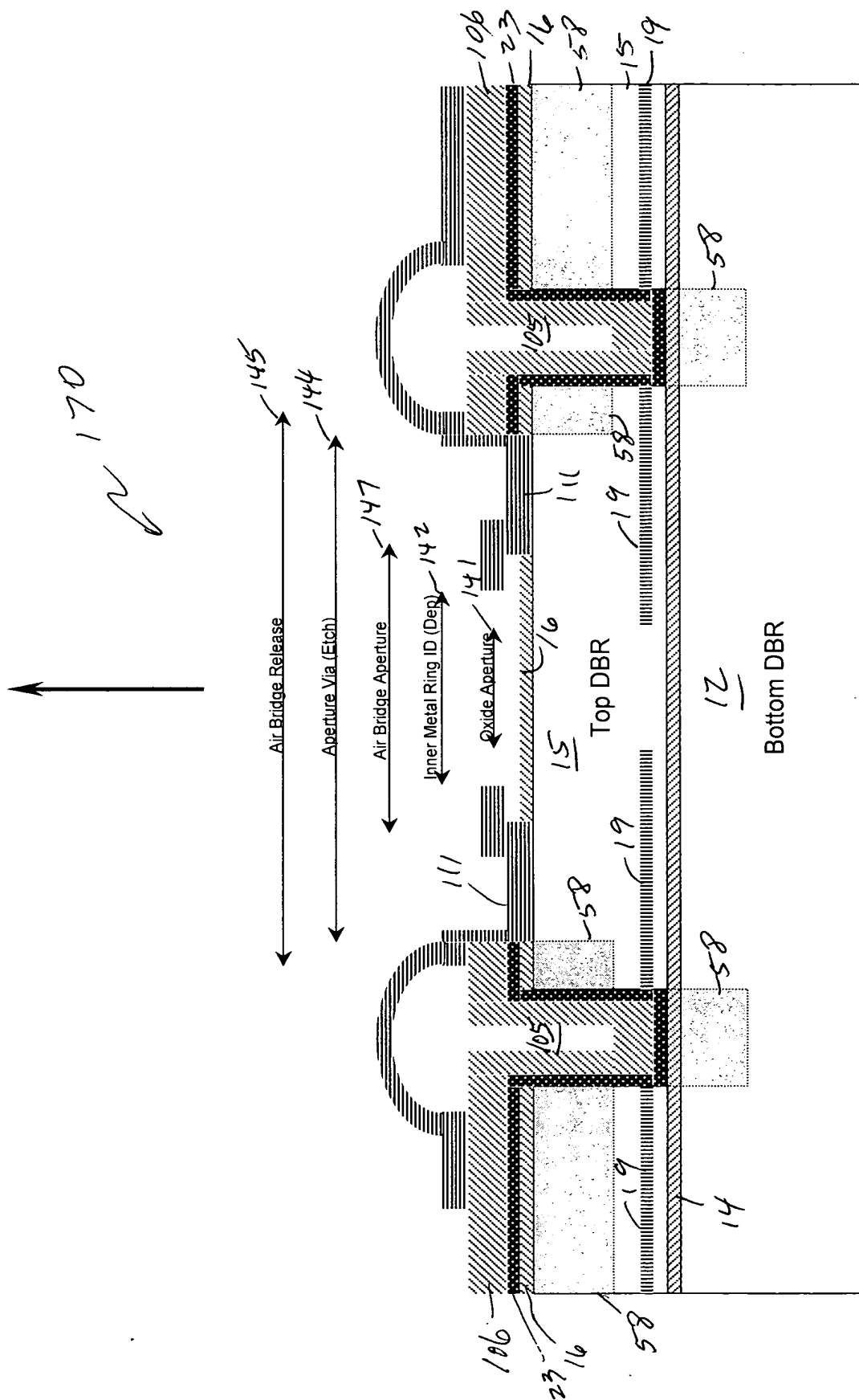
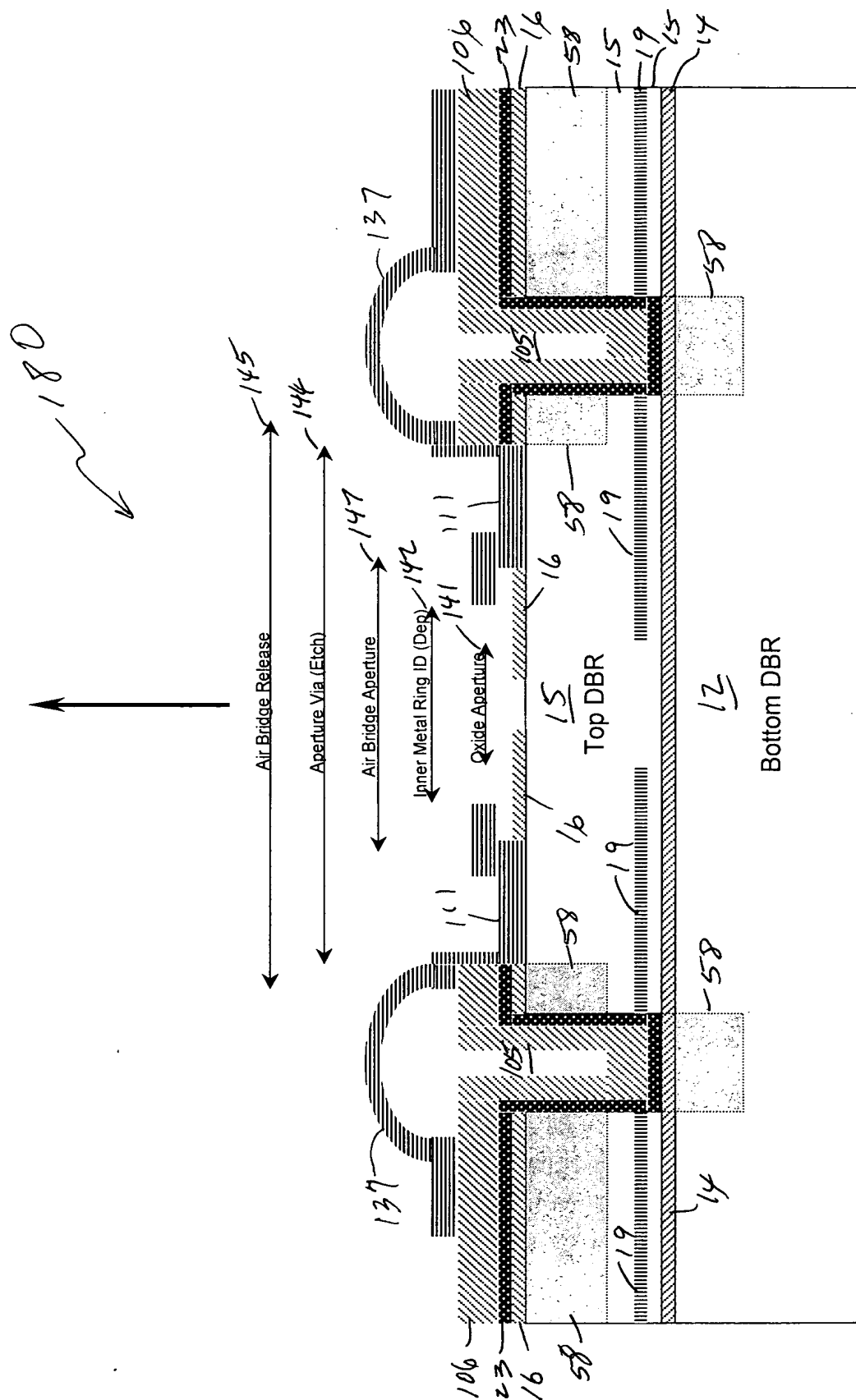


Figure 187



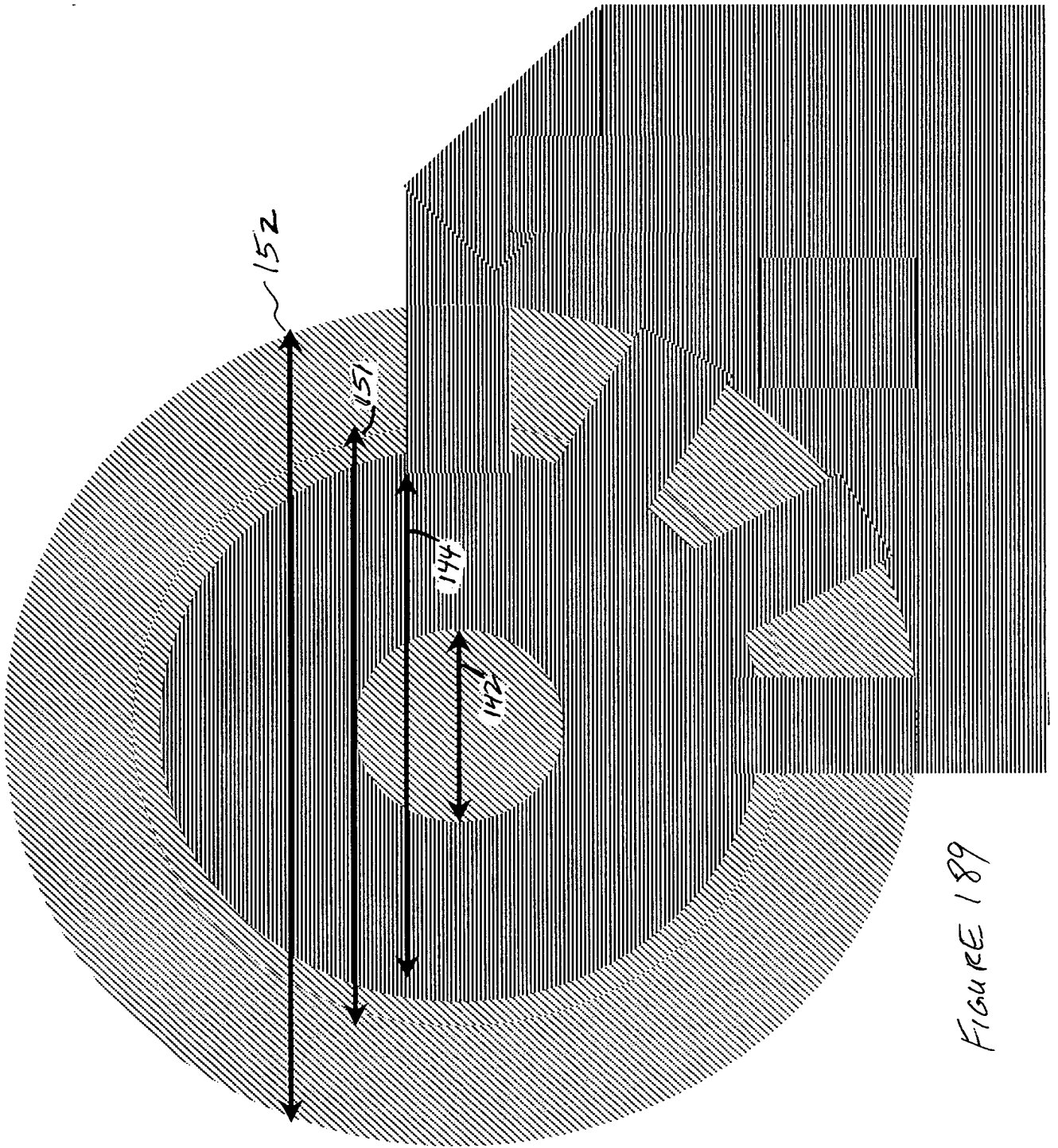


FIGURE 189

Standard Layout Geometry

<u>Feature</u>	<u>Variable</u>	<u>Dimension</u>	<u>Notes</u>
Oxide Aperture	A	Variable	VCSEL Aperture
Oxide Trench ID	B	A+20	10 um lateral oxidation
Thin Trench OD	-	B+5	2.5 um wide trenches
Wide Trench OD	D	B+8	4 um wide trenches
Isolation	-	B-4	Implant isolation
Aperture Via	-	B-4	Area without thick coating
Inner Metal ID	C	A+M	Metal aperture pullback variation
Inner Metal OD	-	B-2	Partially covers trench
Contact Via ID	-	C+3	optional? Extends below metal ID
Contact Via OD	-	B-6	Slightly less than aperture via
Air Bridge ID	-	B-2	For patternable trench fill-ins
Air Bridge OD	-	B+12	Matched to wide trenches
AB Aperture D	-	C+4	Larger than metal ID
Outer Metal ID	-	B+10	Partially covers wide trench
Outer Metal OD	-	B+18	4 um wide outer metal ring
SA Coplanar ID	-	D+8	Largest diameter: 42 um
SA Coplanar OD	-	180	Set to near edge of die
HOM(Metal) Filter	F	Variable	Circle/polygonal pattern in aperture area
HOM(Etch) Filter	F	Variable	Circle/polygonal pattern in aperture area

Oxide Aperture Variations (A): 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 um

Metal Pullback (diameter) (M): 1, 3, 5 um

Higher Order Mode Filter (diameter) (F): .5, 1, 2 um

FIGURE 190